

MEDICAL EXTRACTS.

ON THE
NATURE OF HEALTH,
WITH
PRACTICAL OBSERVATIONS:
AND
THE LAWS
OF THE
NERVOUS AND FIBROUS SYSTEMS.

BY
A FRIEND TO IMPROVEMENTS.

VOL. III.

Homines ad deos in nullâ re propius accedunt, quam salutem
hominibus dando.

CICERO.

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1795.

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What reason can be assigned for the astonishing and still increasing demand for *Quack Medicines* and *Quack Books*? Whence is it, that *Quack Medicines* and *Quack Books* are to be found not only among the lower and illiterate classes of society, but even in respectable families? Is it that they have a higher opinion of such medicines, and of such books, than of the judgment, the skill, the extensive experience, of men devoted to the science of men who have been regularly taught, and who are in the daily habit of distinguishing diseases? No, certainly it is not.—But I leave this important question to be answered by writers on *political economy*, and in the mean time anxiously caution the unwary of being misled by those who have obtained the **KING'S LETTERS PATENT**.—From the Preface to the Rev. Mr. TOWNSEND'S *Guide to Health*.

A judicious practitioner, says Dr. BROWN, and one who prescribes according to the rules, that arise from a near acquaintance with the operations of the inanimate part of matter upon living systems, will find plenty of scope for the exercise of his judgment; and he will find, that the BRUNONIAN DOCTRINE, as it is now nick-named by those who know it not, is not a doctrine to be practised without knowledge, without judgment, and without sense; but that it requires every part of knowledge requisite to throw light upon so extensive a subject, as that of the science of life over all nature, and all the judgment and good sense of the soundest understanding to carry it into application, upon many occasions of nicety and difficulty. The trash that has hitherto passed for knowledge, is to be acknowledged not only useless, but hurtful. *But the true knowledge of NATURE must be always elegant, always satisfactory, always useful.* It is to be hoped the day is not far distant, when this DOCTRINE will change its present appellation, into that of the Doctrine of Nature, over the living part of her productions; comprehending not only the *morbid* but *healthy phenomena*, and the distinction betwixt inanimate and living matter.—From Dr. BROWN's *Elements of Medicine*, p. 300.

TO
THE REV. JOSEPH TOWNSEND, M. A.
RECTOR OF PEWSEY.

SIR,

YOUR GUIDE TO HEALTH
having greatly assisted this Work, independently
of every other consideration, gives you a title
to my acknowledgments. Accept then, Reverend Sir, this token of veneration, of esteem,
and of gratitude, as well for the assistance I have
derived from your *Medical Performances*, as for
the information and amusement you have given
me by your excellent Journey through Spain,
and by your admirable Political Essays.

I have the honour to subscribe myself, &c,

Your obedient and faithful Servant,

&c. &c.

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RECTOR OF PEVERLY.

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J. C.

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AIR; whereas
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 Combination, suspended by *Caloric*, is **NITROUS**
AIR, - - - - - ib.

{ The *Former* of which, being blended with Water, is the
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{ The *Latter*, being combined with Water, is **AQUAFORTIS**,
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{ The PART BITTEN goes into *immediate Putre-*
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{ The SKIN becomes speedily *livid*, - - - ib.

{ And the MUSCLES become *black* and *fetid*, ib.

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{ This *black Appearance*, especially in the
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{ I again covered it with the Shell, and on uncovering it two Hours after, I found it without Motion, - - - - - ib.

{ I then covered it with Water, which I kept on it for ten Minutes, without its producing any Change, - - - - - ib.

{ I drained off the Water, and the Heart was scarcely left in the Air a Minute, when it began afresh to move briskly, and continued to do so several Hours, - - - - - ib.

{ This Succession of Motion in the Turtle, deprived of its IRRITABILITY by the Poison of the *Ticunas*, which was produced by the simple Contact of ATMOSPHERIC AIR, if it does not decisively prove, that the IRRITABLE PRINCIPLE is the OXYGEN of the Air, it nevertheless goes to prove, that the Air is a very active Principle in awakening the IRRITABILITY of the Muscular Fibres and of the Heart, as was maintained in Sect. XXII. Vol. I. of this Work, - - 407

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SÉCT. XXXVII. LAW III. A DEFECTIVE STIMULATION OF ANY ORGAN AC- CUMULATES IRRITABILITY IN THE MOVING FIBRES.

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{ The *Blood-vessels*, the *Stomach*, and *Intestines*,
are in CONSTANT MOTION from the Stimuli
appropriated to them, - - - - - 408

{ The *Muscles*, even when not acted upon by
the nervous Electricity, are nevertheless in
CONSTANT ACTION, as is seen in the *Tremor*
of old Men, in the *Palsy of the Head*, and
from the *Contraction* of antagonist Muscles,
when those which counterpoise them
are cut through, or lose *their Action* from
some paralytic affection, - - - - - ib.

{ The IRRITABLE PRINCIPLE, therefore, is in
continual Action, - - - - - 409

{ The *continued Actions* going on in organized
animated Beings *expend* the IRRITABLE
PRINCIPLE, whether that be OXYGEN de-
rived from the Blood, ELECTRICITY, or
SOME AS YET UNPERCEIVED POWER in the
Fibre, - - - - - ib.

I. If

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I. If the SUPPLY of the IRRITABLE PRINCIPLE to the moving Fibre be <i>equal</i> to the <i>Expenditure</i> by the Action of Stimuli, the Fibre is then said to be in a State of TONE, - - - - -	409
II. If the EXPENDITURE exceeds the Supply of THIS PRINCIPLE to the Fibre, it is said to be in a State of EXHAUSTION, - - -	ib.
III. But if the SUPPLY given to the moving Fibre exceed the <i>Expenditure</i> , the Fibre is then said to be in a State of ACCUMULATION, - - - - -	ib.

SECT. XXXVIII. OF COLD.

{ During the Winter, by the <i>Absence</i> of the Stimulus of Heat, and in part of Light, Plants and many Animals become TORPID, 410	
{ In consequence of this diminished Action, their IRRITABILITY ACCUMULATES, which manifests itself at the return of Spring, - - -	ib.
{ A slight Degree of Heat then produces the most powerful Effects upon the Fibre thus delicately Irritable, - - - - -	ib.
{ Dr. HALE's Experiments respecting the Rising of the Sap in the VINE, - - - - -	411

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The Conclusions to be drawn from his Experiments are,

I. That the Sap flows in the Vine during the SPRING, *quicker* than the Blood in the Vessels of a Horse; that its Progress is considerably *slower* in the SUMMER than in SPRING; very *languid* in AUTUMN; and *ceases altogether* in the WINTER.

II. That it is *great* in the MORNING; *diminished* at MID-DAY; and *little or none* in the EVENING.

III. That when the Vine, however, is *young* and *very vigorous*, the Sap flows *incessantly*, and *fastest* of all in the GREATEST HEAT OF THE DAY; *sinking* only after SUN-SET, - - - 412

{ A Note to shew the *Value* of this last Observation, - - ib.

{ The same may be said respecting the IRRITABILITY of the *Hedysarum Gyrans*, and the *Sensitive Plant*, - - - 413

{ Hence it is, that the Return of *Cold* and *Frost* in the SPRING is so *noxious* to vegetables, and that THIS SEASON is generally *forward* according to the *Severity* of the *preceding Winter*, - - - ib.

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SPALANZANI observes that *Newts* bury themselves and become *torpid*, when the Thermometer in AUTUMN is at 54; and again re-appear in SPRING, when the Thermometer is considerably below 54, - - - 414

FONTANA observes, that when in SPRING he exposed the *Vipers* that were *torpid* to the Heat of 67 Degrees *only* they *died*, though during SUMMER they bear a *much* greater Degree of Heat without the least Injury, - 413

Thus precisely it is with the *vegetable Tribe*, for they sleep in Winter, and are awakened by the vernal Sun; but die if a too powerful Heat be *suddenly* applied, - - - 414

On *this Principle* we may account for the Destruction of Plants by BLIGHT in Spring; for unless there be *Frost at Night*, and on the next Day a *cloudless Sun*, there is no Blight, - - - 415

Hence if Plants be *watered* before the Rising of the Sun, they suffer *no Injury* by the *previous Frost* at this Season of the Year, - ib.

The *Effects* of *Winter* are therefore very great in *cold Climates*, because the ACCUMULATION of IRRITABILITY is in proportion to the Abstraction of the Stimulus of Heat, - ib.

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Hence Corn ripens in LAPLAND in 60 Days, whereas in FRANCE it requires 120 to 160 Days, - - - - -	415
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COLDS AND INFLAMMATORY FE- VERS ARE PRODUCED.	
{ Of the Cold Bath, - - - - -	416
{ The Cold Bath produces a great quiescence of the Capillaries of the Skin, the minute Vessels of the Lungs, and their various ab- sorbent Series, - - - - -	ib.
{ From their Quiescence, occasioned by the want of the Stimulus of Heat, the IRRITABLE PRINCIPLE becomes ACCUMULATED, and hence a greater Quantity of Blood is trans- mitted through them, and in consequence a greater Degree of Heat ensues, - - - - -	ib.
{ The Reason why the COLD BATH is fre- quently of great Service, - - - - -	417
{ Of the Exception, and the Manner to obviate the Evil of COLD-BATHING, - - - - -	ib.
{ An Experiment made by a healthy young Man, who first went into a Cold Bath, where he staid 34 Minutes, and then plunged into a Warm Bath at 90 Degrees, - - - - -	418
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{ Here, for the first Moments, he felt *very warm*, but in two Minutes, being still in the Warm Bath, he was seized with *Shiverings*, - - - - - 419

{ When he came out of the *Warm Bath* he went to Bed, passed a very *feverish Night*, and the next Day had *wandering Pains* over his Body, with *great Weakness* resembling the *incipient Stage* of a *FEVER*, - ib.

{ Now, it can make little Difference, whether a Person pass from *cold Air* or *cold Water*, into *warm Air* or *warm Water*, - - - - - ib.

{ I have often seen, says Dr. BEDDOES, Persons who had long been riding in the *Cold* and *Wet*, experience the *first Symptoms* of *FEVER* upon coming into a *Warm Room*, sitting near *the Fire*, and drinking *Spirits*, - ib.

{ Dr. BEDDOES's *own Experience*, and the Manner he has *prevented* the *Accession* of *FEVER*, - - - - - 420

{ A singular Case arising from the *alternate Action* of *Cold* and *Heat* producing *INFLAMMATION*, - - - - - ib.

{ Mr. CLARKSON, in setting forth the *Impolicy* of the *SLAVE TRADE*, relates, that the Seamen, to make Room for these unfortunate Beings, from the Time of their leaving the Coast of Africa, sleep for the most Part on the Decks, - - - - - 421

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{ From this Exposure at Night to *Cold* and
heavy Dews, and suddenly afterwards, to
the *fierce rising Sun*, **FEVERS** originate
which carry many of them off, - - - 421

{ A *Description* of **THIS FEVER**, - - - - ib.

{ *Inflammations* of the Eye are common in
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Summer to sleep in the *open Air*, - - - 422

{ Of *Persons* most **PREDISPOSED** to *this Attack*, ib.

{ Other **EXAMPLES** to prove, that when the
Body has been exposed to *Cold*, it is liable
to be much more affected by *Heat* and
other Stimuli.

{ Of the Manner of treating *frozen Limbs*, - 423

{ They take *Snow* to rub the Parts benumbed
with *Cold*, and very gradually expose them
to a *warm Temperature*, - - - - - ib.

{ Were a *frozen Limb* to be brought before a
Fire, or immerfed in *warm Water*, a **VIO-**
LENT INFLAMMATION would come on, and
speedily terminate in *Mortification*, - - - ib.

{ The Custom of first applying **COLD** universal-
ly obtains in all the northern *Climates*, - ib.

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IV. The Application of *Stimuli* after a certain Time *exhausts* the IRRITABILITY or EXCITABILITY of the System, 440

V. To recruit which *Loss*, the all-wise and merciful CREATOR has instituted the Season of SLEEP, - - - - - ib.

{ This System of BROWN is compared to Combustion, - - ib.

{ Dr: BROWN conceived, that to each Individual there was allotted only a certain Portion of the IRRITABLE PRINCIPLE from the Commencement of its animate State, - - - - - ib.

{ The Reader will now understand, why Food, Drink, Air, &c. though they support Life, yet consume it; for he will see, that the Application of these Powers, though they bring forth Life, consume the EXCITABILITY or MATTER OF LIFE, just as Air blown into the Fire brings forth more Flame, but wastes the FUEL, or MATTER OF FIRE, - - - - - ib.

{ This is conformable to the common Saying, the more a Spark is blown, the brighter it burns, and the sooner it is spent, - - - - - ib.

{ Common, or ordinary, Sleep, therefore, from what has been said, seems to be a State, which takes place in order to restore the EXCITABILITY of the System, which has been expended by the Application and Action of Stimuli.

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During Sleep,

1. The Stimulus of VOLITION is suspended, - - - - - 441
2. The Stimuli of EXTERNAL OBJECTS is excluded by the *Silence and Darkness* of the Night, - - - - - ib.
3. Even CATHARTICS lose *their Power of Action*, - - - - - ib.

While ATMOSPHERIC AIR is almost the only external Power, which then continues to be applied, at once carrying off what is *excrementitious* from the Lungs, as it affords probably to the System THAT PRINCIPLE, which is *expended* by the *various Actions of Life*, - - - - - ib.

And as COLD accumulates the Irritability of the Fibre, it is wisely fore-ordained that this Season shall be accompanied with a suitable Degree of Cold, - - - - - ib.

Besides the very great quantity of the IRRITABLE PRINCIPLE perpetually expended in moving the *arterial, venous, and absorbent Systems*, as described Vol. I. p. 441. There is also, during our waking Hours, a *constant Expenditure* of IT by the Action of our *locomotive Muscles and Organs of Sense*, 442

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{ It follows, *therefore*, that if the *Exertion* of these Organs of Sense and Muscles be for a while *intermitted*, that a *large Quantity* of the IRRITABLE PRINCIPLE must be *accumulated*, - - - - - 443

{ NUTRITION is probably carried on *during Sleep*, - - - - - 444

{ The Reason why SWEATS are so likely to break out towards Morning, - - - - - ib.

SECT. XLI. SOME PRACTICAL OBSERVATIONS.

{ The Reason why we ought to go to Bed and rise up in the Morning at a *regular Hour*, - - - - - 445

{ The End of SLEEP is to regain *that Irritability*, which has been *expended* by the Exertions of the preceding Day, - - - - - ib.

{ The Chamber in which we sleep ought therefore to be, - - - - -

1: *Silent*, - - - - - ib.

2: *Dark*, - - - - - ib.

And 3. *Moderately Cold*, - - - - - ib.

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We should not sleep surrounded with *Curtains*.

1. Because the OXYGEN or VITAL AIR, imbibed by the Lungs, if not THE PRINCIPLE, favours at least the *Recovery* of IRRITABILITY, - - - - ib.

And 2. Because it makes up part of the *digestive Process*, which chiefly goes on during Sleep, - - - - ib.

Snoring arises from impure AIR in the Chamber, more commonly than from any Defect in the Organs destined to draw in the Air for the proper Change of the Blood, - - ib.

The *Poor* exhausted by their Labour go to Bed early, get up at Sun-rise, and *accumulate* fresh IRRITABILITY by the *Coolness* of the Morning, - - - - 446

The *blooming Complexion* of the Peasantry compared with the *sickly Visage* of the Sons of Luxury, who turn *Night* into *Day*, and *sleep* in *Beds of Down*, clearly demonstrates which Mode of Life is most conducive to HEALTH, - - - - ib.

Those, who sit up at Night, and sleep late in the Morning, hurt their Constitutions *without gaining Time*, and ought not to repine at a *fashionable State of bad Health*, - ib.

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{ Study protracted far into the Hours of Night, Cares harboured, and even very late Hours in COMPANY, by encroaching on the Hours adapted for Sleep, are sure to lay the Foundation of many dreadful Diseases, -	447
{ The EFFECTS which arise from Want of Sleep, - - - - -	ib.
{ King HENRY's Soliloquy, - - - - -	448
{ It is thought by the Greek Poet unnatural for a King to enjoy a whole Night's rest, - -	449
{ Lord LYTTLETON's Death ascribed to a Want of Sleep, - - - - -	450
{ The Character of this Nobleman, - - - - -	ib.
{ The Studious ought to limit their learned Labours to proper Hours, and all others are advised to solicit Sleep by a seasonable Dis- missal of Business and Care, - - - - -	ib.

SECT. XLII. OF IMPURE AIR.

{ As Sleep arises from the Exhaustion of the IR- RITABLE PRINCIPLE, it is procured,	
1. By Fatigue from muscular or mental Exertion, - - - - -	451
2. By increasing the Action of the System by other Stimuli, - - - - -	ib.
3. By	

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3. By <i>Sounds</i> , which divert the Mind from Volition, - - - - -	452
And 4. By the <i>Abstraction</i> in part of the Stimulus of <i>Oxygen</i> from the Air, -	ib.
{ A Note to shew that the <i>new Chemistry</i> has not introduced idle and ridiculous <i>Speculations</i> , - - - - -	453
{ An Enumeration of the Physicians, and other Gentlemen of literary Education, who have united in favour of the <i>factitious Airs</i> , and other <i>Substances</i> , of which the Appli- cation to Medicine has been suggested by <i>modern philoso- phical Discoveries</i> , - - - - -	ib.
{ Dr. CRAWFORD, the celebrated Author of a Work on animal Heat, is a new Accession of Strength, - - -	ib.
{ He became a Patient to Dr. THORNTON, and inhaled the <i>Hydrocarbonate</i> , - - - - -	ib.
{ The <i>Effects</i> which <i>this Air</i> had on Dr. CRAWFORD, - -	ib.
{ The Experience of Dr. BEDDOES, in which he is able to induce <i>Sleep</i> almost at will by means of the <i>Hydrocarbonate</i> , - - - - -	ib.
{ The ANALOGY which there is between <i>Sleep</i> , and the State of <i>Torpor</i> in dormant Animals, - - - - -	454
{ <i>Cold</i> puts all Animals of this Class to <i>sleep</i> , except the MARMOT, - - - - -	455
{ THIS ANIMAL closes up the Aperture of his subterraneous Dwelling, and <i>then</i> it be- comes <i>torpid</i> , - - - - -	ib.

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{ Though expoſed to a Cold equal to that of Freezing, while in the <i>open Air</i> he remains unaffected, - - - - -	456
{ Does not the ſtagnant Air of the Cell, deprived in part of <i>Oxygen</i> , and ſuperſaturated with <i>fixed Air</i> from his Breathing, produce, together with the <i>Cold</i> , the State of <i>TORPOR</i> ? - - - - -	457
{ The <i>Bees</i> which were carried to <i>JAMAICA</i> , as they are not confined by Cold, ceaſed to make Honey after the firſt Year, and have become very troubleſome, - - - - -	458
{ In cold Climates, if the Weather is ſufficiently ſevere, <i>Bees</i> become <i>torpid</i> , and do not conſume their Proviſion, - - - - -	457
{ If the Weather is not ſufficiently cold they conſume their Winter's Store, - - - - -	ib.
{ Might not an Experiment with a reduced Atmosphere turn out of <i>twofold Advantage</i> with reſpect to <i>Bees</i> ? - - - - -	ib.
{ The Manner in which theſe torpid Animals are to be <i>re-animated</i> , - - - - -	456
{ The Symptoms which ariſe from a ſudden and forced <i>Re-animation</i> , - - - - -	ib.
{ Vegetables throw out <i>Azotic Air</i> during the Night, - - - - -	457

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During the Day they emit VITAL AIR, and imbibe FIXED AIR, which arises from Respiration and Combustion, so admirable is the reciprocal Intercourse betwixt the animal and vegetable Kingdoms, - - - - -	457
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SECT. XLIII. OF REST.

Wakefulness compared to Exertion, and Sleep to Rest, - - - - -	459
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From voluntary Exertion, the Will gets fatigued by the Expenditure of the SENSORIAL POWER, as the Muscles do by the Expenditure of the IRRITABLE PRINCIPLE, - - -	ib.
---	-----

Every one has experienced the Refreshment arising from Repose, and it is an established Fact, that for a Horse to perform a long Journey, he should be previously kept at Rest for several Days in the Stable, - - -	460
--	-----

We stretch our Limbs after profound Sleep from the Accumulation of the IRRITABLE PRINCIPLE in the Fibres, - - - - -	ib.
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From the SAME CAUSE we yawn, when the Muscles of our Face has been long in a State of Inaction, - - - - -	ib.
---	-----

CHILDREN, who have abundant Irritability, are never easy but in a Change of Position, - - -	ib.
---	-----

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{ The *pungent Pain* felt upon holding one's Hand when much chilled to the Fire, is another Exemplification of the same Principle, which seems to be a general Law of animated Nature, - - - - - 423

{ By respiring a *cold Atmosphere* the same Thing happens to the Nostrils, Fauces, and Lungs, as to the external Surface of the Body upon going into a *Cold Bath*; and if we pass suddenly from such an Atmosphere into a *warm Room*, what happens to the Skin will in some Degree happen to the Membrane lining these Cavities; a GLOW or INFLAMMATION will ensue, according to the *Difference* between the two *Temperatures*, and the *Length of Time* passed in the *Cold*, - 424

{ *Children* are so susceptible of INFLAMMATION, that a great Part of the Mortality among them is to be ascribed to the *Ignorance* of Mothers and Nurseries of the Power which even a moderate Change of Temperature, if suddenly made, has to effect their tender and irritable Frame, - - - - - ib.

{ A Table of DEATHS to confirm this Assertion, 425

{ *Three Parts* in *four* die before they have attained their full Growth, without answering any other Purpose than to give Trouble and endure Pain, - - - - - 426

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{ Does not this arise from something *wrong* in our Management, or is the human Frame so weakly contrived and executed? - - 426

{ If then *the Management* of our Children be *wrong* in any very material Point, may not a *Stop* be put to THIS EXCESSIVE MORTALITY? - - - - - ib.

{ One may, with the greater Propriety, disseminate the Knowledge, "HOW COLDS, FEVER, RHEUMATISMS, ETC. ARE CAUGHT," as this is far from being generally understood even by the Members of the Medical Profession themselves, - ib.

{ If this is thought to be a wanton paradoxical Assertion, he may find in the Case of *Opium*, and of the *cool Treatment* of the *Small-pox*, Instances equally striking, of one Generation of Pathologists passing away after another imbibing the same Errors, so servilely imitative an Animal is Man! - - 427

{ Few *Climates* are so *changeable* as our own, - ib.

{ We frequently find a *cold* and *keen Day* succeeded by one as *mild*, or even as *warm* as *Summer*; or, what is worse, the *Forenoon* is accompanied with a *sharp, dry, north-east Wind*, and the *latter Part of the Day* is *uncommonly warm*, - - - - - ib.

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{ It is impossible, but that this *sudden Change* from *Cold to Heat*, must, in delicate Constitutions especially, be productive of Mis- chief, - - - - - 427

{ The *Constitution* has Powers of ADAPTING IT- SELF to *these Changes*, if they be *gradual*, 428

{ Thus we bear *without Injury* the *Heat* of SPRING after the *coldest* WINTER, - - ib.

{ But where the *Change* is *more violent* than in the Transition from one Season to another, as when *Europeans* go to the *East* or *West Indies*, the Effect is strongly marked, - - ib.

1. The CIRCULATION becomes *quicker*.
2. The PERSPIRATION *freer*.
3. A LASSITUDE or DEBILITY takes place.
4. The SECRETION of Bile is increased, &c.

{ In short *more* or *less* of FEVER is produced, which *varies* in different People according to Circumstances, and *continues* until the *increased Force* of the Heart and Arteries, kept up by the *accumulated Irritability* of the System, from the previous Effect of Cold, *ceases*; that is, until the IRRITABILITY OF THE FIBRE and the EXTERNAL STIMULUS be *properly adjusted*, - - - 429

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{ It has been before observed, that if the Hand has been exposed to *Snow*, and afterwards suddenly brought to the *Fire*, a VIOLENT INFLAMMATION would ensue, - - - 430

{ So when a Person is out in very *cold Weather*, the Air, every Time he draws his Breath, brushes his Nostrils, Wind-pipe, and Lungs; and just as is the Case with the *outward Skin*, it makes *these Parts* more liable to be INFLAMED by *Heat*, - - - 431

{ A COLD, therefore, is nothing more than an INFLAMMATION of THE CHILLED PART, which is the *smooth moist Skin* which lines the *Nostrils* and goes down the *Wind-pipe* into the *Lungs*, - - - ib.

{ While we are exposed to *Wet* or *Cold* there is *no Tendency* to INFLAMMATION, but it is the *subsequent Heat*, *Exercise* in *changing* our *Garment*, or *Stimulants*, which produce the GLOW, or INFLAMMATION, - - - 432

{ The Manner in which a *Cold* may be *avoided*, - - - 433

{ Of the POPULAR TREATMENT of *Colds*, and ITS DANGERS set forth, - - - ib.

{ The Reason why the *antiphlogistic Treatment* should always be preferred, - - - ib.

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SECT. XXXIX. OF DARKNESS.

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{ The Stimulus of LIGHT is <i>favourable</i> to Health, - - - - -	434
{ In <i>asthenic Diseases</i> it is <i>particularly service-</i> able, - - - - -	ib.
{ The Effect that the <i>Window-tax</i> has had on the Health of Individuals, - - - - -	ib.
{ This was observed by the philanthropic Mr. HOWARD, -	ib.
{ It is right to stir up HUMANITY in the Cause of <i>suffering</i> <i>Nature</i> , and to point out the <i>Evils</i> inflicted by the <i>Go-</i> <i>vernors</i> on the <i>Governed</i> ; and since even a <i>bad Govern-</i> <i>ment</i> is, comparatively speaking, a <i>Blessing</i> , to occasion it to be so administered as to make it the FIRST OF BLESSINGS, - - - - -	ib.
{ To shew that IRRITABILITY is ACCUMULAT- ED by the Absence of Light, GIRTANNER enveloped the Leaves of the <i>Mimosa</i> in an <i>opaque Body</i> , so that the Light could not penetrate, and he found all these Leaves became <i>considerably more irritable</i> than the rest, - - - - -	435
{ Animals living near the <i>Arctic Circle</i> grow <i>white</i> , - - - - -	ib.
{ The same may be observed of Animals that inhabit the <i>Alps</i> , - - - - -	ib.

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{ Mice kept in a Cage in a dark Room produce *white Mice*, - - - - - 435

{ Men as they recede from the Line are proportionably *fair*, - - - - - ib.

{ The *Irritability* is found to correspond with *these Shades*, - - - - - 436

{ In every Climate CHILDREN are born *fair*, and become darker as they advance in Life, - - - - - ib.

{ The *soft flaxen Hair* inclining to *red*, and the *blue Eye*, denotes an IRRITABILITY of Temperament, - - - - - ib.

{ The *curled black and strong Hair*, with a *black Eye*, shews a *stronger Fibre* with less IRRITABILITY, - - - - - ib.

{ *Blanched Plants* are incapable of supporting a great Quantity of Light, - - - - - 437

{ In the *white Negro* born of black Parents exhibited in London, - - - - - ib.

1. The *Hair* was of a *Silver white*.

2. The *Eye* was so *impatient* of the Stimulus of *Light*, that it was almost in constant Action.

3. She had even *lost one Eye*.

4. Her

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4. Her Son was subject to *scrophulous Tumours* in the Neck, and was a *Mulatto*, though her Husband was a white Man, - - - 437

{ From the *excessive Irritability* of the optic Nerve the *white Negroes* are *incapable* of enduring a *Glare of Sun*, and only enjoy his *reflected Rays from the Moon*, - - - ib.

{ Hence they are called *MOON-EYED*, - - - ib.

{ These are principally found in *America*, - - - ib.

{ They are universally described by all Travel- lers, as a Race of *low Stature*, of a *feeble Make*, and *unable to support the slightest Fatigue*, - - - - - ib.

{ There is now at *Exeter Change* a Man born of black Pa- rents, who is *directly pie-balled*, - - - - - ib.

{ 1st. Query. Would THE TRADERS IN HUMAN FLESH feel some conscience in selling the *white Negro Woman*? - - - ib.

{ 2d. Query. On which Side would the Balance of Opinion preponderate with them with regard to the *pie-balled Man*, - - - - - ib.

{ It is melancholy to observe the Pains some *white Men* have been at to represent the *black Race* as a lower Species of Animal;—to confound them with the *Monkey*;—or if Men, to degrade them into Beings destined by a benevo- lent and superintending PROVIDENCE to become the Slaves of such as boast the Names of *Christian* and *Eu- ropean*, - - - - - 438

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{ If they are *uncivilized*, it is YOU who have plunged them deeper in their Darkneſs, - - - - - 438

{ If their Country is *unfruitful*, it was *once* the chief Reſource of *Rome*, - - - - - ib.

{ If *barbarous* in the Extreme, you have ſet them a ſtill more barbarous Example, - - - - - ib.

{ And if it ſhall be ſaid, that the 18th Century was an *enlightened Period*, YOUR DEEDS will be adduced to *diſprove the Aſſertion*. Vide Part I. p. 54: alſo Note †, p. 56. - - - - - ib.

SECT. XL. OF SLEEP.

{ More than *one Third* of the Life of Man is conſumed in the irrational State of *Sleep*, - 439

{ The *Wiſdom* of the AUTHOR of NATURE, however, is manifeſt in this *ſeeming Imperfection* of his Work, - - - - - ib.

According to Dr. JOHN BROWN,

I. *Life* is a *forced State*, - - - - - ib.

II. *Every animated Being* has only a *certain Portion* of the IRRITABLE PRINCIPLE, - - - - - ib.

III. *Every Power* that acts upon the *living Frame* is STIMULANT, or produces *Excitement* by expending IRRITABILITY, - - - - - ib.

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After animal Fibres have for some Time been exerted into <i>Contraction</i> , a <i>Relaxation</i> succeeds, even though the exciting Cause continues to act.	
1. <i>a.</i> In our <i>muscular Exertions</i> it is experienced, as no one can hang long by the Hands, however vehemently he wills to do so, - - - - -	461
2. <i>b.</i> And the Changes of our Attitude evinces the Necessity of Relaxation to those Muscles which have been long in action.	
2. In respect to the <i>irritative Motions</i> this is exemplified in the peristaltic Contractions of the Bowels, and the Beatings of the Heart, which cease and are renewed alternately, though the Stimulus of the Aliment and Blood continue to be uniformly applied, - - - - -	460
3. In <i>sensitive Motions</i> , as in Fits of the Stone and Gravel, and in Parturition, though the Stimulus is perpetual, - - - - -	461
{Dr. DARWIN's Term SENSORIAL POWER explained, -	ib.
{By the Motion of a Fibre the IRRITABLE PRINCIPLE becomes expended, and the Fibre, as was said before, ceases to act,	
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though the Stimulus be applied;—till in a certain Time the Fibre has *received* a *due Supply* of the IRRITABLE PRINCIPLE, when it becomes again ready to contract from the *same Stimulus*, - - - - - 461

If this Stimulus be withdrawn for a Time, the IRRITABLE PRINCIPLE becomes *accumulated*, and contracts with *equal Energy* from the Action of a *weaker Stimulus*. Or if an *equal Stimulus* be applied, it is thrown into *more violent Action*, - - - 462

1. Thus a State of *Sleep* subsisting for some Time induces a State of the System more ready to be affected by Stimuli of all Kinds. Vide Cullen's *Materia Medica*, Vol. II. - 446

2. *a.* Thus if the Stimulus of Heat be withdrawn by covering the Hands with *Snow*, the IRRITABLE PRINCIPLE, which had habitually been supplied to the Fibres, becomes now *accumulated* in them, owing to the Want of its being expended by their accustomed contractions; and thence a less Stimulus of Heat will now excite them into violent Contraction, - - - - - *ib.*

b. Thus on a *frosty Day* with a *bleak Wind*, the Face of a Person exposed

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to the Wind is at first pale and shrunk: But on turning the Face from the Wind, it becomes soon of a Glow, with Warmth and Flushing, - - - - - 463

c. The Glow of the Skin on emerging from a *Cold Bath* is owing to the same Cause; for by lessening the Quantity of Heat for a Minute or two by going into the Cold Bath, a great *accumulation* of the IRRITABLE PRINCIPLE is necessarily produced. On emerging from the Bath the irritable Fibre is therefore thrown into greater Exertion by the Stimulus of the Warmth of the Atmosphere, and a great Increase of animal Heat ensues, - - - - - ib.

These Examples present us with the Phenomena of a FEVER FIT; for the *Hot-fit* of intermittent Fevers are in consequence of the previous *cold Ones*, - - - - - ib,

The *Symptoms* of Fever may be explained upon THIS PRINCIPLE.

1. The *Cold-fit*, - - - - - 464
2. The *Hot-fit*, - - - - - 466

The *Cure* of Intermittents also depends upon THIS PRINCIPLE, - - - - - 468

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Sometimes however the <i>IRRITABLE PRINCIPLE</i> does not accumulate from <i>Inertion</i> , as was explained,	
1. Respecting the <i>Cold Bath</i> , p. 417, - - - -	467
And as will be seen in the Section treating on,	
2. <i>Hydrothorax</i> , Water in the Chest, - - - -	ib.
3. <i>Anasarca</i> , general Dropsy, - - - -	ib.
4. <i>Typhus</i> , putrid Fever, - - - -	ib.
In these three last Instances the <i>Inertion</i> arose from the <i>Exhaustion</i> of the <i>IRRITABLE PRINCIPLE</i> , as was explained in <i>Letter II.</i> p. 361, - - - -	ib.

SECT. XLIV. OF HUNGER.

There are *three Classes* of Readers.

1. Those who seek to find in a Work the *Agreeable* with the *Useful*, - - - - 469
2. Those who are pleased only with the *Profitable*, - - - - ib.
3. Those who read in order that they may not appear *ignorant* of the Contents of any popular Work, - - - - ib.

These *three Classes* of Readers will find their Account in this Work, - - - - ib.

For the *first Class* of Readers this Work was designed, - - - - ib.

The *second Class*, by reading the Table of Contents, may turn easily to those practical Points they wish only to see discussed, ib.

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{ And the <i>Third</i> , by reading the Analysis in the Table of Contents, may know the Substance of the whole Work in a few Hours,	469
{ This ANALYSIS, however, was intended merely to <i>refresh</i> the <i>Memory</i> of the <i>first Class</i> of Readers,	ib.
{ The Narrative of Captain BLIGH's Voyage,	ib.
{ The Reason why a <i>full Account</i> of the Sufferings and-Escape of Captain BLIGH is given to the Readers,	470
{ The APOLOGY to such as wish for an <i>abridged-View</i> ,	ib.
{ The Object of the Voyage, was to transport the BREAD-FRUIT Tree from the Society Islands to the West Indies,	ib.
{ A Description of the BREAD-FRUIT,	ib.
{ Its <i>vast Importance</i> , and the Manner in which it is produced,	ib.
{ The Ship was named BOUNTY,	471
{ The Cabin appropriated to the BREAD-FRUIT was contrived by Sir JOSEPH BANKS,	ib.
{ It was <i>completely fitted out</i> by GOVERNMENT,	ib.
{ The Commands of the ADMIRALTY,	472

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{ The Attempts that were made by the Chiefs to bring back these deserters, - - -	485
{ They deliver up themselves to Captain BLIGH, being much harassed by the Na- tives, who were constantly watching an opportunity to surpise them, - - -	486
{ In a Day or two after, the <i>Cable</i> was cut nearly asunder, - - -	487
{ Captain BLIGH expressed <i>great Indignation</i> against the Natives, - - -	ib.
{ The chief Families retire through Fear to the Mountains in the midst of heavy Rain, -	488
{ The Reasoning of Captain BLIGH on this Event, - - -	489
{ The <i>Object</i> of the Voyage was now fulfilled, and 1015 BREAD-FRUIT Plants, in a flour- ishing Condition, were put on board, besides <i>several other Fruits</i> , - - -	ib.
{ The Chiefs of the Island dine with Captain BLIGH, who is loaded with a Variety of Things from the Natives, - - -	490
{ In the Evening, the <i>Departure</i> of Captain BLIGH being announced, there was no <i>Dancing</i> or <i>Mirth</i> on the Beach as was the Custom, but all was <i>mournful Silence</i> , - -	ib.
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{ The DEPARTURE from <i>Otaheite</i> , - - -	491
{ All at present was <i>Prosperous</i> , but very soon a different Scene took place, - - -	ib.
{ An Account of the SECRET CONSPIRACY that was formed to seize the Ship, - - -	492
{ The cruel Treatment that Captain BLIGH met with from the <i>Mutineers</i> , - - -	ib.
{ He is seized while asleep in his Cabin, handcuffed and threatened with instant Death, -	ib.
{ Captain BLIGH's magnanimous Behaviour at this Moment, - - -	ib.
{ The PROGRESS of the <i>Mutiny</i> , - - -	493
{ The Conduct of the <i>Mutineers</i> during this Transaction.	
{ The furious Behaviour of CHRISTIAN, - -	492
{ The <i>Mutineers</i> force Captain BLIGH and eighteen of his Men into a small Boat twenty Feet in Length, and turn them adrift into the open Ocean, - - -	493
{ They laugh at the helpless Situation of the Boat, - - -	497
{ Some Account of the chief <i>Mutineer</i> of this Conspiracy, - - -	499

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{ CHRISTIAN shewed at last some Signs of Repen- tance, - - - - -	500
{ The Cry of HUZZA FOR OTAHEITE was fre- quently heard among the Mutineers, -	501
{ The Reason of this Disaffection, - - - -	502
{ The chief Cause must be attributed to the Wo- MEN of Otaheite, - - - - -	502
{ The Influence which Modesty had over rude Minds in this Instance is very striking, - - - - -	503
{ They imagined they should become fixed in the midst of Plenty on one of the finest Islands in the World, - - - - -	503
{ They were encouraged also by the Natives, -	ib.
{ Hence Desertions were frequent from most of the Ships, which have gone to the Society Islands, - - - - -	504
{ The Secrecy of the Mutiny was beyond Con- ception, - - - - -	ib.
{ Neither Captain BLIGH, nor any of the Men with him, had the smallest Conception of it, though they had lived upon Terms of the greatest Intimacy with some of the Mutineers, - - - - -	505

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{ Captain BLIGH and his Men row towards Tafaa, - - - - -	505
{ On this Island there is a <i>Volcano</i> , which is constantly burning. Here they could not find any other Signs of Inhabitants than a few desolate Habitations, - - - - -	507
{ The whole Country seemed covered with Lava, and had a most dreary Appearance, ib.	
{ There was a <i>Cave</i> in this Island, where part of Captain BLIGH's Crew slept, to give the others Room, who were in the Boat, - -	509
{ The Night was passed free from Danger, and in the Morning some of the Natives came to them and traded in a very <i>peaceable</i> <i>Manner</i> , - - - - -	510
{ The Spirits of every one was revived, and they no longer regarded Captain BLIGH with those anxious looks, which had con- stantly been directed towards him since they lost Sight of the Ship, - - - - -	ib.
{ The Natives flocked in great Numbers from all Quarters of the Island, and soon exhi- bited an <i>hostile Intention</i> , - - - - -	511
{ They knocked <i>Stones</i> together, which was the Sign of an Attack, - - - - -	ib.

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{ Captain BLIGH remained in this Cave during the Day, and towards *Sun-set* every Person taking with him his Proportion of Things retreated towards the Boat, - - - - 513

{ The Chiefs eagerly asked of him, " Whether he did not intend sleeping in the Cave, as on the preceding Night," - - - - ib.

{ The Answer being in the *Negative*, the elder Chief started up, and said, If you do not mean to sleep on Shore to Night, then "*Mattie*," which means, *we will kill you instantly*, and immediately withdrew, - ib.

{ The *Onset* was now preparing, - - - - ib.

{ Every one made a Noise with the Stones he held in his Hand, and the other Chiefs ran away, one of whom forcibly wrested himself from Captain BLIGH, - - - - ib.

{ While Captain BLIGH (who remained the last on Shore with the Carpenter) was hauling into the Boat, one of his Men undauntedly ran up the Beach to cast the Stern-fast off, notwithstanding the others called to him to return, - - - - 514

{ The Attack was now begun by about *two hundred Men*, - - - - - ib.

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{ The <i>unfortunate Sailor</i> on the Beach was soon knocked down, - - - - -	514
{ Many Indians got hold of the <i>Stern-rope</i> , and were hauling the Boat on Shore; but for- tunately Captain BLIGH had a Knife in his Pocket, with which he cut the Rope, or otherwise they had effected their Pur- pose, - - - - -	ib.
{ Seeing the Boat row off, they fill their Canoes with Stones and renew the Attack, - - -	ib.
{ Captain BLIGH adopted the Expedient of throwing overboard <i>some Clothes</i> , which fortunately they stopt to pick up, - - -	515
{ It then became <i>dark</i> , and they gave over the Attack and returned to Shore, - - - -	ib.
{ The <i>Reflections</i> which this Event gave rise to, -	ib.
{ They request Captain BLIGH to take them Home, - - - - -	516
{ The Provisions being examined, the Allow- ance was <i>an Ounce of Bread</i> and a <i>Quarter</i> of a <i>Pint of Water</i> PER DAY for each Man, -	ib.
{ They experience a <i>great Storm</i> , - - - -	517
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{ The Sea broke over the Boat, and the Bread they had would have been spoilt, had they not fortunately had a <i>Chest</i> , which the Carpenter had secured, when the Mutiny took place, - - - - -	517
{ The dreadful Situation they were in from Cold and Hunger, and the EFFECT that one Tea-spoonful of Rum had on these famished Persons, - - - - -	518 & 522
{ An Account of the Voyage, and the Distresses they experienced, - - - - -	519
{ The Crew are amused by Captain BLIGH's Description of the Situation of <i>New Holland</i> and <i>New Guinea</i> , - - - - -	522
{ Very little Sleep was procured, and that by no means refreshing, - - - - -	ib.
{ It rained continually, - - - - -	ib.
{ The Manner in which the Evil of <i>wet Clothes</i> was obviated, - - - - -	ib.
{ Extra-Allowance is requested, and refused, - - - - -	526
{ The Joy that was exhibited, when any one was to have a Tea-spoonful or two of Rum, - - - - -	527
{ EXTREME HUNGER was now very apparent, but no one suffered from Thirst, - - - - -	ib.

Cramps

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{ <i>Cramps and Pains</i> always succeeded <i>Sleep</i> , -	528
{ <i>SLEEP</i> afforded no <i>Relief</i> , and Captain <i>BLIGH</i> says, for his Part, " <i>he almost freed without it</i> ," -	ib.
{ Their Situation became now very distressing,	529
{ The Sun for the first Time for fifteen Days shone out, and the Sea was calm, -	ib.
{ The <i>Allowance</i> is abridged, and <i>Supper</i> omitted, -	530
{ Some <i>Noddies</i> were caught, and divided into 18 Portions, -	531
{ The <i>Symptoms of Disease</i> that universally appeared, -	ib.
{ Among the rest there was no <i>alvine Excretion</i> , -	532
{ The same was mentioned by <i>BETTY CANNING</i> , who was confined in a Loft, by a gipsy Woman, at <i>Enfield Wash</i> , and lived three Weeks on a <i>Loaf</i> and a <i>Pitcher of Water</i> , -	ib.
{ Another Instance of the <i>same Symptom</i> recurring is mentioned in this Work, -	530
{ They at length reach the Coast of <i>New Holland</i> , -	532

They

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{ They land and find Plenty of Oysters and fresh Water, - - - - -	533
{ The <i>Alarm</i> that was excited which occasion- ed a <i>Suspicion</i> of <i>Poison</i> , - - - - -	ib.
{ <i>Intoxication</i> was excited, - - - - -	ib.
{ A Note to shew the <i>Cause</i> of this, - - - - -	538
{ The <i>Alarm</i> however was dissipated, seeing the Birds eat of these Berries, - - - - -	ib.
{ Two of the Crew are taken <i>extremely ill</i> from <i>Fatigue</i> and the <i>Heat</i> of the <i>Sun</i> , - - - - -	535
{ Towards Evening, from the Obstinacy of one of the Party, the Fire on Shore was in- creased during the Absence of Captain BLIGH, which communicating with the neighbouring Grass occasioned a Flame, as if the whole Country was in a Blaze, - - - - -	536
{ Thus the Relief which was expected from an undisturbed Sleep on Shore was totally lost, for if attacked, they had neither Arms nor Strength to oppose an Enemy, - - - - -	ib.
{ They therefore, as soon as possible, proceed- ed to Sea, after having remained six Days on the Coast of <i>New Holland</i> , where they found Oysters, a few Clams, some small Birds, and Water, - - - - -	ib.

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{ The other Advantages they derived from being on Shore, - - - - -	537
{ The <i>Confidence</i> that univerſally prevailed of being able to reach TIMOR, was a chief Cause of their Preservation. As to Captain BLIGH, he mentions that he neither felt <i>extreme Hunger</i> nor <i>Thiſt</i> , - - -	ib.
{ The <i>Allowance</i> is ſomewhat <i>increaſed</i> , - -	539
{ The <i>gaſtly Appearance</i> of Famine again appear, and ſeveral ſhew the melancholy Prefages of approaching Diſſolution, - -	540
{ A little <i>Wine</i> proved of conſiderable Benefit, but the Expectation of reaching TIMOR was the chief Support, - - - - -	ib.
{ At Three in the Morning TIMOR is diſcerned, - - - - -	541
{ The <i>Exceſs</i> of Joy that this Event occaſioned, -	ib.
{ The Report of two Cannon, which were fired early in the Morning, gave new Life to every one, - - - - -	543
{ At Day-light Captain BLIGH landed, amidſt a Crowd of Indians, and were agreeably ſurpriſed to meet with an Engliſh Sailor, who belonged to one of the Veſſels in the Road, - - - - -	ib.

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{ The Abilities of a Painter, perhaps, could seldom have been displayed to more Advantage, than in the Delineation of the two Groups of Figures, which at this Time presented themselves to each other, 543

{ An indifferent Spectator would have been at a loss which most to gaze at; the Eyes of Famine sparkling at immediate Relief,—or the Horror of their Preservers at the Sight of so many Spectres, whose ghastly Countenances, if the Cause had been unknown, would rather have excited Terror than Pity, - - - - - 544

{ The good People of TIMOR ran with eagerness to procure a Surgeon to dress their Wounds, to get Apparel to cover their Nakedness, and a Place suitable for their Reception, - ib.

{ The Governor, who was dying of an incurable Disease, even hastened from his Bed to welcome their Arrival, - - - - - ib.

{ The Inhabitants of TIMOR ran with Chairs, Tables, and Benches, and Bedding, to an empty House that was assigned them, - - ib.

{ A plentiful Dinner was provided, - - - - - ib.

{ A SUMMARY VIEW of the Dangers of the Voyage, - - - - - 545

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That the State of Captain BLIGH, and his Company, was that of ACCUMULATED IRRITABILITY is strongly pointed out, - - -	546
1st. From one Tea-spoonful of Rum producing so GREAT AN EFFECT, - -	ib.
2d. From the Berries found in New Holland occasioning SYMPTOMS OF INTOXICATION, - - - - -	ib.
3d. By the general Want of Sleep, and that producing no Refreshment, -	ib.
During the last War in India TIPPOO SULTAN released Lieutenants CHALMERS and NASH, in order that they might take two Letters to treat for Peace with the Marquis CORNWALLIS, - - - - -	547
This was done in the Hopes of lulling the Commander into a treacherous Security, -	ib.
As the NIZAMS were stationed at some Distance, a Party of TIPPOO SULTAN'S Horse stole betwixt the two Armies, and asked for the Burra Said or Chief, - - - -	ib.
Not suspecting them to be Enemies they pointed to his Tent, - - - - -	ib.
These Horsemen then galloped immediately towards the Tent, and having drawn their Swords, cut down several Lascars and People in their Rout, - - - - -	ib.

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{ Their Progress, however, was soon stop'd, but
they got off, having sustained very little
Loss, - - - - - 548

{ This Scheme is not unfrequently practis'd in
the East, - - - - - ib.

{ The *Mahomedan Horse*, when sent upon such
Services, are kept *fasting*, and then *intoxi-*
cated with *Bang*, of which they have a
large Dose before they enter upon so ha-
zardous an Enterprize, - - - - - ib.

{ This Inebriation renders their Exertions so
wild and disunited, that it is impossible for
them ever to prove successful against a vi-
gilant Enemy, - - - - - ib.

{ It was thus in former Days, when the *Jesuits*
wanted any desperate Act of Wickedness
to be done, they shut up the man, whom
they had pitched upon to accomplish it,
into a Chamber lighted with a small glim-
mering Taper, hung with black Cloth, on
which were painted Hell-flames and
Devils, and all Manner of terrible Shapes.
Here he *fasted* and meditated for twenty-
four Hours, after which he had an *intoxi-*
cating Draught, was told his Errand, and
not unfrequently it was *Murder*, - - - 549

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	PAGE
{ The Bravery of <i>SEXTIUS BACULUS</i> , as recorded in <i>Cæsar's Commentaries</i> , is supposed, by <i>Dr. PERCIVAL</i> , to be owing in some Measure to <i>this Cause</i> , - - -	ib.
{ The Story of a Physician at <i>Geneva</i> who fasted three Days and Nights, - - -	ib.
{ <i>The Symptoms</i> that arose in consequence, -	550
{ The first Food he took was <i>veal Broth</i> , which had an <i>intoxicating Effect</i> , producing a Glow of Warmth, and raising his Spirits, so as to render him ashamed of his Despondency, ib.	
{ <i>HIPPOCRATES</i> observes, that <i>Abstinence</i> affects People according to their <i>Age</i> , - - -	ib.
{ The <i>Reason</i> of this explained and exemplified by the affecting Story of Count <i>UGOLINO</i> , who was confined with his four Sons in a Tower; the Key of which being cast into the River <i>Arno</i> , they are, in this horrible Situation, starved to Death, -	551
{ In the Attempts to recover those who have suffered under the Calamities of <i>FAMINE</i> , <i>great Circumspection</i> is required, - - -	ib.
{ The Body, by <i>long Fasting</i> , is reduced to a State of <i>EXTREME IRRITABILITY</i> , - - -	ib.
{ Under <i>such Circumstances</i> , there are Instances of Persons who have been suddenly <i>struck dead</i> in consequence of having took a <i>full Meal</i> , and drank a Glass of <i>Brandy</i> , - -	ib.

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As with those who have been <i>Frost-bitten</i> , Friction with <i>Snow</i> or <i>cold Water</i> , is the only safe Stimulus that can at first be ap- plied to the Surface, so here the <i>lowest</i> Stimulus in the Scale is preferable to that sudden Transition too often practised by UNPHILOSOPHIC PRACTITIONERS, - - -	ib.
The external Heat should be at first lower than that of the human Body, and gradu- ally increased, according to the Effects of that Stimulus, - - -	552
Whey, Gruel, weak Broth, is the only Nourish- ment that can with propriety be administer- ed. If Cordials are employed, they must be given with a most frugal Hand, and considerably diluted, - - -	ib.
SECT. XLV. ON ASPHYXIA FROM COLD.	
One Half of the World thinks not on the Mi- series of the other Half, - - -	553
An Enumeration of DISTRESSES going on in this transitory Scene, - - -	ib.
Of the Man lost in the Snow, where he pe- rished, - - -	ib.
When through Exposure to Cold, the Fingers, or other external Parts of the Body, are frozen, if artificial Heat be suddenly applied, a Mortification ensues, and the Parts that have been FROST-BITTEN drop off, - - -	555

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{ A <i>Comparison</i> of the Effects of COLD and SUB-		
MERSION.		
1. Loss of <i>Sense</i> and <i>Motion</i> ,	- - -	ib
2. Loss of <i>Animal Heat</i> ,	- - -	ib.
{ Both are restored by,		
1. <i>Inflating</i> the Lungs with <i>Vital Air</i> ,	-	ib.
2. By a <i>gentle Degree</i> of <i>Warmth</i> ,	- -	ib.
3. Both are <i>destroyed</i> by a <i>Heat too</i>		
<i>great</i> , or <i>too suddenly applied</i> ,	- -	ib.
{ Indeed the GRAND SECRET of the ART		
of <i>restoring suspended Animation</i> consists in		
NICELY ADJUSTING THE NATURAL AND		
ARTIFICIAL STIMULI TO THE EXACT TONE		
OF THE IRRITABLE FIBRE, - - - -		556

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2. Loss of Animal Heat	10
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1. Restoring the Lungs with Warm Air	10
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3. Both are relieved by a Hot Bath	10
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Induced the GREAT SECRET of the Art	
of restoring suspended Animation consists in	
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ARTIFICIAL STIMULI TO THE HEART AND	
OF THE HEART AND LUNGS	10

SECT. XXXV.

LAW II.

and every fibre will furnish in proportion some share of
A TOO GREAT EXCITEMENT OF ANY ORGAN EXHAUSTS
 its own irritability to supply the loss in any one fibre.

THE EXCITABILITY OF THE CONTRACTILE FIBRE.

Thus it is that a too powerful stimulus acting upon any
 one part of the system, such as the spine of invertebrates
 and the end of the tail of vertebrates, produces death. For the same reason a

EVERY stimulus which affects one of the fibres affects
 the others at the same time, and in like manner. Hence
 the sympathy of different and separate parts, and those
 surprising phenomena which hitherto have been ex-

plained by the harmony of the nerves. These sym-
 pathetic phenomena are observable throughout all organized
 nature. Whatever part of the *polypus* be touched, the
 whole will contract, and its arms will contract them-
 selves by sympathy. If a *worm* be touched with the
 point of a pin, without wounding it, the whole worm
 will be seen to contract itself; which is a certain proof

that the different parts are affected by sympathy. Hence
 the irritable fibres, which are combined together in every
 individual, whether animal or vegetable, form a sys-
 TEM OF FIBRES, in which the integral parts act con-

tinually

tinually upon *the whole*, while *the whole* re-acts upon *the parts*, so that every stimulus which acts upon any fibre in the system, will deprive that part of its irritability; but this loss will be soon repaired by the system, and every fibre will furnish in proportion some share of its own irritability to supply the loss in any one fibre. Thus it is that a too powerful stimulus acting upon any one part of the system, such as the abuse of spirituous liquors, and tonic medicines, exhausts in the end the whole system, and produces death. For the same reason, a very powerful stimulus applied to one part of the system, such as the poison of a rattlesnake, will, in an instant, exhaust all the irritability, render the blood fluid, and destroy the animal.

From what has been said, it will appear, that the IRRITABILITY of the system is never in a permanent condition, but incessantly ebbing and flowing like the tide; constantly in motion, like the pendulum in its vibrations, or rather bearing resemblance to the Leyden phial, when it is alternately charging, discharging, and discharged.

When the sum of the stimuli acting upon the contractile fibre is too great, the fibre loses more irritability than it receives, and of course in a short time finds it-

self

self in a state of EXHAUSTION, and *this exhaustion* will be either,

1. *Temporary*, or

2. *Irreparable*.

1. In the state of *temporary exhaustion* the fibre fails for want of IRRITABILITY. The application of the ordinary stimulus, while it is in *this state*, will not make it contract. It is only by little and little that the fibre recovers its IRRITABILITY. This truth, I dare venture to say, is *as new* as it is *striking*, and it unfolds a vast number of phenomena hitherto inexplicable.

Let us observe, for example, the *tremulous writing* of old men, or *the motion* of the heart;—*the heart* contracts from the stimulus of the blood, and impels the blood through the arteries; it then again dilates, and the blood enters. But *the heart* does not contract itself *immediately* upon the first impression of the blood. Its IRRITABILITY having been lessened by the preceding contraction, it requires half, or three quarters of a second, before the IRRITABILITY of the heart shall have been recruited to such a degree that the same stimulus can act upon it.

The periods of women are explained on the same principle. The stimulus of the ovaries acting continually in them after the age of puberty (as I shall prove elsewhere);

elsewhere), nevertheless, does not produce its effects till the end of eight and twenty days; because this period of time is necessary for the uterus, in its state of health, to accumulate its IRRITABILITY in sufficient quantity for the stimulus to act; the discharge ceases after the irritability of this organ has been diminished, and returns with the returning irritability.

Thus during the operation of an emetic or cathartic, the stomach and bowels is alternately in a state of excitement and repose. And thus the most violent pains and labour of a parturient woman, if not effectual for the expulsion of the offspring, cease for a time, and are then renewed. Thus likewise all the appetites are liable to fits, returning after cessation at stated periods; if it be hunger, at the distance of some hours; if it be fever, it may be explained on the same principle; that is to say, any stimulus which is always present, and continually acting upon the fibres, produces no sensible effect, till the exhausted irritability of the fibre shall have accumulated afresh.

You can scarcely touch the leaf of the *mimosa pudica*, or sensitive plant, so slightly as not to make it close. The large rib which runs along the middle of the leaf, serves as an hinge on which the two halves of the leaf turn on

being touched, till they stand erect, and by that means meet one another. The *slightest touch* gives this motion to one leaf; if *a little harder*, it gives the same motion to the leaf opposite. If the touch be *still rougher*, the whole arrangement of leaves on the same rib close in the same manner. If it be *stronger still*, the rib itself moves upwards towards the branch on which it grows. And if the touch be yet *more rough*, the very branches shrink up towards the main stem.

In August, one of these plants growing in a pot was put into a carriage. The motion of the carriage caused it to shut up all its leaves, and the effect of *this great stimulus* was, that it did not again *expand* its leaves for more than four and twenty hours. A *TORPOR* then ensued: for having opened their leaves, they *closed* no more for three days and as many nights.—Being then brought again into the open air, the leaves *recovered* their natural motions, *shutting each night*, and *opening in the morning*, as *regularly* as ever.

All the *periodical motions* of plants and animals, as well as their *periodical diseases*, may be explained upon the same principle; that is to say, any *stimulus* which is always present, and continually acting upon the fibre, produces no sensible effect, till the *exhausted irritability*

of the fibre shall have been *accumulated afresh*. The *periodical motions* in organized bodies depend on the *alternate exhaustion and accumulation* of the irritability of the fibre. A *temporary exhaustion* of the irritability of the *bedysarum gyram* is produced by the heat of the sun and by electricity. The electrical fluid *exhausts* in like manner the irritability of the *mimosa*.

Let us consider the stimulating or exciting power of *wine*. When a depressed man is insufficiently excited with the *natural stimuli*, and rises not, suppose, above 30 degrees in his excitement, a glass carries him up to 32 degrees, another to 34 degrees, and so forth, till after five glasses he is carried up to 40 degrees, he then finds himself well and vigorous in all his functions. But still we are not so firmly made, as not to bear a little of what is either *too much* or *too little*. Suppose he then takes five glasses more, and consequently is raised to 50 degrees. As his spirits, his intellectual, and all his other functions, were low, while his excitement remained at 40 degrees, so are they all proportionally exalted by the time that his excitement is elevated to 50 degrees. Let him still go on, and his intellectual functions will rise still higher; he will now display the full extent of his genius; and his passions and emotions of
whatever

whatever kind they be.—If he goes on, *how will the appearance be reversed!* The hero* soon shrinks into a mere brute. He falls off in both his intellectual and corpo-

* Vide the Elements of Physic. That JOHN BROWN perhaps caught the first idea of his philosophy from ARMSTRONG'S Poem on the Art of Preserving Health, as before hinted, page 210 of this work, is in some measure confirmed, by comparing the above with the following lines. Speaking of the effects of wine, Dr. ARMSTRONG says,

" Struck by the powerful charm, the gloom dissolves
 " in empty air; *Elysium* opens round.
 " A *pleasing phrenzy* buoys the lighten'd soul,
 " and sanguine hopes dispel your fleeting care;
 " and what are difficult, and what was dire,
 " yields to your *proceeds* and *superior stars*:
 " the happiest you, of all that e'er were mad,
 " or are, or shall be, could this folly last.
 " But soon your heaven is gone; a heavier gloom
 " shuts o'er your head: and, as the thundering stream,
 " swollen o'er its banks with sudden mountain rain,
 " sinks from its tumult to a SILENT brook;
 " so, when the *frantic raptures* in your breast
 " subside, you languish into mortal man;
 " you SLEEP,—and waking find yourself undone.
 " FOR PRODIGAL OF LIFE IN ONE RASH NIGHT
 " YOU LAVISH'D MORE THAN NIGHT SUPPORT THREE DAYS.
 " A heavy morning comes; your cares return
 " with tenfold rage, &c. BOOK IV.

It is not meant to derogate ought from the illustrious founder of the new philosophy of medicine: JOHN BROWN will ever retain his advocates, and the rancour of his enemies will prove how far he was the original inventor of this beautiful and coherent system. Another might, at a chance time, like a meteor, shine forth, but this light was soon lost in the thick gloom that overspread this branch of science; whereas, in the theoretical writings of JOHN BROWN, we see the effulgence of the noon-day. And if he was not always practically just, we have to lament the shortness of his career of life, and the vastness of that persecution that was invidiously raised against him.

real functions; his tongue, his feet, his eyes, his memory, fail him; and at last, deprived of all power of motion and sense, he sinks into an inanimate SLEEP.

If a grain of *opium* be swallowed by a person unused to such a strong stimulus, all the vascular system in the body acts with greater energy, all the secretions, and the absorption from those secreted fluids, are increased in quantity, and much pleasure is introduced into the system, independent of our ordinary train of thinking, which adds an additional stimulus to that already too great.

After some time *the excitability becomes diminished in quantity*, being expended by the great activity of the system; and thence when the stimulus of the opium ceases, the fibres will not obey their *natural stimuli*, and a *consequent torpor* ensues, as is experienced by drunkards, who, on the day after a great excess of spirituous liquor, feel tremor, palpitation of the heart, head-ach, and general debility. During this *torpor* (as will be proved when treating of Law III), an *accumulation of excitability* in the exhausted fibres takes place, which is so great, as to occasion a *second over-exertion* on the application

even

even of the *ordinary stimuli*, and thus an *unequal balance* of the *excitability* and of the *natural stimuli* continues for two or three days, where the stimulus was violent in degree; and for weeks in some fevers, from the stimulus of contagious matters*.

But if a *second dose* of opium be exhibited before the fibres have regained their natural quantity of due excitability, its effects will be much less than the former, because the *excitability* is in part *exhausted* by the previous excess of exertion. Hence all medicines repeated frequently gradually lose their effect. Thus aloetic purges lose their efficacy by repetition; and opium and tobacco, if not taken beyond their usual doses, cease to stupify and intoxicate those who are habituated to their use.

But when a stimulus is repeated at *such distant intervals* of time, that the natural quantity of *excitability* becomes completely *restored* in the acting fibres, it will then act with the same energy as when first applied. Hence those who have lately accustomed themselves to large doses of opium or aloe by beginning with small ones, and gradually increasing them and repeating them frequently; if they *intermit* the use of it for a few days

* Vide Part IV. The Sect. on *Fever*.

only, must begin again with as small a dose as they took at first, otherwise they will experience the inconvenience of an over-dose*.

2. The fibre is said to be in a state of *irreparable exhaustion*, when it does not recover its due degree of *IRRITABILITY*, and fails upon the application of the *proper stimuli*. All then is languor and debility. The actions within the body are insufficient for the maintenance of life.

The babe is a compound of matter, so organized as to be capable of being acted upon by various stimuli, necessary to the continuance of life; and immediately upon its birth the first stimulus it receives is a quantity of at-

* A lady labouring under a cancer of her breast, was advised to the use of cicuta (hemlock); and she accordingly got a quantity of it in powder, and weighed out the doses of it for herself. She began with a small dose; and feeling no sensible effects from that, she went on increasing the quantity. By the time she had come to 60 grains, she had taken the whole parcel she had got from the apothecary, and therefore sent to him for a fresh parcel of the powder. She had in the interim been advised, that when she was to pass from one parcel to another she should begin with a small dose only; therefore, as she had taken 60 grains of the former, she would take 20 of the new parcel. But such was the effect of *intermission*, that these 20 grains had very nigh killed her. In 10 or 15 minutes she was affected with sickness, tremor, giddiness, delirium, and convulsions. Happily for her the sickness proceeded to a vomiting, which threw up part of the powder, or the whole, but notwithstanding this the delirium, and even the convulsions, continued many hours. Vide *Cullen's Materia Medica*.

mospheric air in the lungs; this, with the addition of some milk, or mild food, taken into the stomach, is all the stimulus it seems capable of bearing, at this period, consistent with life and health; the external senses cannot endure any strong action on them; hence the tympanum, or drum of the ear, is kindly covered for some time after birth with a thick mucus occasioning deafness, and the eyes are shut against, or turn from, the impression of strong light. In this state, as was before shewn, there is the *keenest irritability*; the smallest stimulus, even that of the air of a chamber, more especially the purer and colder air abroad, and the mildest food, so act upon it, and exhaust it, as to produce almost constant sleep*. From day to day the *irritability* of the fibre gets *diminished*, as is known to us by the circumstance of the same stimulants having a lesser effect on the fibre, in proportion as we advance from infancy to puberty, and from puberty to manhood. At this period of life, viz. about 35 years of age, it appears that there exists, as it were, a just equilibrium between the powers of the *ordinary stimulants* and the *irritability* in the muscular fibre; yet, at the same time, as the continued application of the ordinary stimuli is absolutely

* Vide Law III. *On the Accumulation of Irritability*; also page 140.

necessary

necessary to life and health, so the daily effects of these is a small degree of *exhaustion of irritability*, and the state of health and periodical sleep. But again, according to the organization of our bodies, though sleep restores the healthy state of *irritability* in a certain degree, yet it seems never to restore actually *the former state*; a small degree of *exhaustion of irritability* takes place every year. This gradual change, consequently, not only indicates the power of bearing, but also the necessity of the application of stronger stimuli, as we advance in life, until, at last, that state takes place which we call *old age*, which is little affected by the ordinary, and scarce sensible of the stronger stimuli; and as these gradually cease to make the impressions necessary to the continuance of life, *the death of old age* must take place; which happens to mankind at different periods of life, earlier if they have given themselves up to pleasure and a variety of excesses, and later with those who have followed a moderate way of living, and been generally temperate in their excitements.

The *state* of the frame in consequence of *frequent inebriety*, or of daily taking *too much vinous spirit* without inebriety, consists in the *paralysis* which usually succeeds long and violent excitement. Sometimes the stomach

is

is more materially affected, and *paralysis* of the lacteal system is induced; whence a total abhorrence from flesh-food and general emaciation. In others the lymphatic system is affected with *paralysis*, and dropfy is the consequence. More frequently the secretory vessels of the liver become first *paralytic*, and a *torpor* with consequent gall-stones or scirrhus of this viscus is induced with concomitant jaundice; otherwise it becomes *inflamed* in consequence of *previous torpor**, and this inflammation is frequently transferred to a more sensible part, which is associated with it, and produces the rosy eruption of the face, or some other eruption on the head, or arms, or legs. In some enebriates the *torpor* of the liver produces pain without scirrhus, gall-stones, or eruption, and in these epilepsy or insanity are often the consequence. All which will be more fully explained in Part IV. of this work.

The same effects arise from an imprudent use of TONIC REMEDIES. We have a very remarkable instance of this in the history of the *Portland Powder*, called so from its having cured, of an hereditary and inveterate gout, one of the dukes of that name. It consists of equal parts of the following herbs, viz.

* Vide Law III. On the Accumulation of Irritability.

Take the roots of round BIRTHWORT,
 _____ and GENTIAN,
 The tops & leaves of small GERMANDER,
 _____ lesser CENTAURY,
 _____ and ground PINE. Equal parts. Powder
 them.

A dram of this powder was ordered to be taken, in some convenient liquid, in a morning, fasting, the patient tasting nothing for an hour and an half after it; it must be used in this dose for *three months* without the least interruption. Forty-five grains are to be taken daily in the same manner for the succeeding *three months*: half a dram every day for the next *six months*: and half a dram every other day during the *second year*.

From very ancient times down to the present, *aromatic bitters* have been recommended and employed for the gout; and as this remedy, on its first coming into use in England, seems to have been of service, and to have cured several, it might have been expected, had not its consequences been often found hurtful, that the use of it would have continued, and this disease would have ceased to be one of the opprobria medicorum. We find, however, that while at one period a course of bitters, prolonged above a year, has been in fashion in this disease;

case, at another it seems to have been entirely neglected; and this I can impute only to its being attended often with consequences more serious than the gout itself. That the latter was the case, we may presume from the accounts of the ancients, who, though they recommend the remedy in *certain constitutions* as highly beneficial, allow that in other cases it has been as highly pernicious.

In nine instances, says Dr. CULLEN, I had occasion to know, or to be exactly informed, of the fate of persons who had taken the *Portland Powder* for the time and in the quantities prescribed. These persons had been liable for some years before to have fits of a regular or very painful inflammatory gout; but after they had taken the medicine for some time, they were quite free from any fit of inflammatory gout; and particularly, when they had completed the course prescribed, had never a regular fit, or any inflammation of the extremities, for the rest of their life. In no instance, however, was the health of these persons tolerably entire. Soon after finishing the course of their medicine, they become valetudinary in different shapes; and particularly were much affected with dyspeptic, and what are called nervous complaints. In those whom I knew,

short

3 C 2

some

some hydropic symptoms appeared, which gradually increasing in the form of an ascites or hydrothorax, especially the latter joined with anasarca, in less than two, or at most three years, proved fatal. These accidents happening to persons of some rank, became very generally known in this country, and has prevented all such experiments since.

ANIMAL and VEGETABLE POISONS exhaust in like manner, but with more expedition, the irritable principle in the fibre.

I procured, says FONTANA, fifty of the strongest and largest frogs I could meet with. I preferred these animals because they are livelier than others; because they die with greater difficulty; and lastly, because their muscles contract even several days after they are dead. I had each of them bit by a *viper*, some in the thigh, others in the legs, back, head, &c. Some of them died in less than half an hour, others in an hour, and others again in two and three hours. There were likewise others among them that fell into a languishing state, their hind legs that had been bitten continuing very weak and *paralytic*. In some of them I contented myself with introducing cautiously into a wound, made with a lancet at the very instant, a drop of venom.

These

These last lived longer than those I had had bit; neither of them however escaped. A short time after these animals had either been bit, or wounded and venomed, the *loss* of their *muscular force* was very evident. When they were set at liberty, they no longer leaped, but dragged their legs and bodies along with great difficulty, and could scarcely withdraw their thighs when violently irritated: by degrees they became motionless, and *paralytic* in every part of the body, and, after continuing a very short time in this state, died.

I now opened the abdomen, and stimulated the nerves that pass through it in their way from the vertebrae to the thighs. I employed the strongest corrosives, but could excite no motion or tremulus in the lower extremities. I pricked the muscles with as little effect, and thrust a long pin into the spinal marrow, without producing any motion or trembling either of the muscles or limbs. In none of these parts was there a vestige of *sensibility* or *irritability*. The nerves were no longer the instrument of motion. The muscles no longer contracted, or were sensible to stimuli. The heart alone, in a few of them, continued to move languidly, and its auricles were filled and *blackened* by the blood which it seemed incapable of dispelling.

dispelling. This motion, and these oscillations, were however but of short duration.

Persons have been met with, who having been bit by a viper, have remained *paralytic* in some particular part of the body during life. A short time ago a woman in TUSCANY, who had been bit in the little finger by a viper, became, after various other complaints, *paralytic* throughout the whole right side of her body, and could never be cured. In a word, it is certain that all those who have met with this accident complain soon after of an *universal weakness*. Their muscles refuse their office. They become dull and heavy, have no longer the free exercise either of body or mind, and fall insensibly into a kind of *lethargy*: so true it is, that this venom induces a *palsy* of the muscles, and robs them of their active property, called by the moderns *animal irritability*.

The *aspic* also kills by occasioning a sudden *drowsiness* and *universal weakness*, followed by death, in the animal struck by it. Hence it seems that all the poisons supplied by the animal kingdom, occasion death by *exhausting the irritability* of the moving fibres.

But of all the poisonous animals hitherto known, the *polypus* seems to possess the most powerful and active venom.

venom. However irritable these creatures may be in other cases, and difficult to kill, the *polypus* succeeds instantly in extinguishing the principles of motion and life in *water-worms*. What is very singular, its mouth or lips have no sooner touched this worm than it expires, so great are the force and energy of the poison it conveys into it. No wound is however found in the dead animal. The *polypus* is neither provided with teeth, nor any other instrument calculated to pierce the skin, as I have assured myself, says FONTANA, by observing it with excellent microscopes.

If we reflect on the effects of OPIUM, its mode of action will also clearly illustrate this subject. That vegetable juice, if taken in a *large dose*, begins by rendering an animal weak and torpid, and soon kills it by *exhausting the irritability* of the muscular fibres, as I have several times observed in animals with cold blood, and as the famous BARON DE HALLER demonstrated a long time ago, even in those that have the blood warm.

The symptoms and accidents that follow *the bite* of the *viper*, do not differ essentially from those I have just spoken of, and may at least induce one to suspect that the venom of that animal likewise kills by totally destroying *the irritability* of the fibres.

Both

Both of them act by exciting violent *convulsions* and vomiting †. Each conveys an *universal debility* into the organs. They render the muscles *paralytic*, make the animal *heavy*, and finally bring on *lethargy*.

* *Convulsions* appear to arise, says FONTANA, from the destruction at different times, and in an irregular manner, of the *irritability* of the muscular fibres. It has been unjustly attributed to a superabundance of animal spirits. Weak languishing animals, that die from hunger, perish in dreadful convulsions. It is besides certain, that men and women of a delicate and weak frame are always the most subject to convulsions; and it is not possible to suppose in these persons superabundance of animal spirits.

We know that all the muscles, even in a relaxed state, preserve notwithstanding a *certain tension* of their fibres, which, when they are cut, never fail to contract themselves and enlarge the wound. When a muscle becomes paralytic it lengthens, and its antagonist then contracts the more; which shews that repose of the muscles depends on the equilibrium of strength betwixt the different muscles, and betwixt their different fibres. The powers thus balanced destroy and renew themselves at every instant, without producing any motion or sensible change. This *natural tension* of the muscular fibres arises either from the nervous electricity (see Part I. Sect. XII. p. 114), or from the exact distribution of *well oxygenated blood* in the whole substance of the muscles. If these muscles do not receive the same proportion of *well oxygenated blood*, or if the *arterial blood* be distributed with an unequal quickness and energy amongst them, the *equilibrium* of the mutual efforts of the muscles is immediately destroyed; the strongest of them contract; and hence arise *convulsions* and *agitations* of the whole frame. It is for this reason, that those who die of an hæmorrhage, as well as those who perish by poison, or by breathing mephitic airs, are seized with *convulsions*: for it certainly is not probable that the loss of blood, and of strength, should bear an *equal proportion* in every part, in every muscle, and in every fibre, whilst the *circulation* itself is *unequal*, and the *principle of irritability* is dependent on, or derived from, the *blood*.

† Those who breathe for any length of time mephitic air are seized first with faintness, and if life becomes not immediately extinct, are attacked with vomiting. Vide Part I. p. 90.

and death. It avails nothing to animals with cold blood, that they are endued with an obstinate life, and are capable of preserving that, as well as motion, after they are cut to pieces. If either of these poisons attacks the principle of their motion, that is, destroys OXYGEN upon which the IRRITABLE PRINCIPLE depends, they die speedily, all motion is annihilated in them, and their parts will no longer give any signs of life. Their body, it is true, will preserve its organization; but an organized body that has lost its motion, is truly a body without life, and the body then differs in nothing from a fossil, or any other dead matter, for all this assemblage of vessels, so many different organs, and this astonishing structure of parts, are no longer of any use to the animal, and should be regarded as not existing, for without IRRITABILITY, there is neither sensation nor life.

It may not be amiss here to inquire a little into the foundation of that *memorable doctrine* maintained by some philosophers, "THAT OXYGEN IS THE PRINCIPLE OF IRRITABILITY, AS IRRITABILITY IS THE PRINCIPLE OF LIFE." Vide the *Memoirs of GIRTANNER*, p. 211; and the Rev. Mr. TOWNSEND's *Guide to Health*, p. 306.

SECT. XXXVI.

OF OXYGEN AS THE PRINCIPLE OF IRRITABILITY.

Perhaps from the new chemistry, which is daily unfolding the profoundest secrets of nature, and, among the rest, the delicate play of living machinery, a method may be devised of restoring IRRITABILITY to the system. The Materia Medica was formerly supposed to contain distinct specifics for the diseases of each separate organ; it is now regarded as little else than a collection of evacuants and stimuli; so that medicine is become in a great measure the art of administering drams. Hence it can often only amuse or palliate, and must sometimes injure, by forcing into motion constitutions already too much worn. How would our resources be multiplied, if we could give IRRITABILITY as well as STIMULANTS! “*But is so salutary a revolution in medicine possible?*” I do not know; but it is worth while to enquire.

Dr. BEDDOES.

AFTER having proved that the venom of the viper, *aspec*, &c. occasion death by destroying the IRRITABILITY of the fibres, we should next examine THE CONDITION OF THE BODY WHEN DEPRIVED OF THIS PRINCIPLE.

The truly constituent principles of vegetables are three,

1. HYDROGEN,
2. OXYGEN,
3. CARBON.

I call these constituent parts, says the celebrated LAVOISIER, because they are common to all vegetables,

and

and because no vegetables exist without them; and by way of distinction from other *substances* which are essential to the constitution of some particular vegetables, but not to all.

Of these *three principles*, two of them, namely HYDROGEN and OXYGEN, have a great tendency to unite with CALORIC, or *matter of heat*, and it takes in consequence an *elastic form*, or *gas*;—while the CARBON, on the contrary, is a *fixed principle*, and has very little affinity or desire to combine with *the matter of heat*.

On the other side, the OXYGEN, which tends to unite with nearly equal forces either to the HYDROGEN or the CARBON in the *ordinary temperature*, has on the contrary greater affinity with the CARBON at a *red heat*: the OXYGEN consequently quits at *this degree of heat* the HYDROGEN, and unites with the CARBON, and forms FIXED AIR.

Although we be far from knowing the degree of these forces of affinities, and from being enabled to express them by numbers, at least we are certain, from what passes daily before us, that however variable they may be with regard to the degree of temperature, they are all nearly in *equilibrium*, or, what is the same thing (from

the digestive* and excreting† living powers), the equilibrium is always kept up at the temperature in which they exist; thus vegetables do not contain either OIL, or WATER, or FIXED AIR, but they contain THE ELEMENTS of all these substances †. The HYDROGEN is not combined, either with OXYGEN or with CARBON reciprocally; although in the living state the principles of these three substances form a triple combination, whence EQUILIBRIUM of rest result.

A very slight change in the temperature is sufficient to overturn all this entanglement of combinations.

If the temperature to which the vegetable is exposed does not much exceed that of boiling water;

1. The HYDROGEN and OXYGEN reunite, and form WATER, which passes in the distillation;
2. A portion of HYDROGEN and of CARBON unite together, and form a VOLATILE OIL;
3. Another portion of CARBON becomes free, and being the most fixed principle, remains in the retort.

* The powers in the body which repair.

† Those powers which throw off superfluities.

‡ Mons. LAVOISIER does not mean to deny the existence of OILS altogether in vegetables; for some OILS may be expressed; and essential OILS evaporate spontaneously and by the heat of the air, and their existence is therefore evident. But the OILS of which he denies the previous existence are those only which are obtained by distillation.

But

But if, instead of a heat nearly equal to boiling water, a red heat be applied to vegetable substances, then WATER is no longer formed (or rather that WATER which may be formed by the first effect of heat is decomposed).

1. The OXYGEN unites to the CARBON, to which it has a greater affinity at this degree of heat, and the FIXED AIR is formed;

2. The HYDROGEN now becoming disengaged, escapes in the form of GAS, while it unites with THE MATTER OF HEAT.

At this degree of heat no OIL is formed, or if it were formed, it would be decomposed.

We see then that the decomposition of vegetable matters is effected, at this degree of heat, by means of double and treble affinities, and that while,

1. The CARBON attracts the OXYGEN in order to form FIXED AIR;

2. The MATTER OF HEAT attracts the HYDROGEN, and they together form INFLAMMABLE GAS*.

The

* That vegetables are composed of HYDROGEN, OXYGEN, and CARBON, may be also proved by SYNTHESIS. If you put a pea into a bottle it will at a given temperature shoot out and branch itself into foliage. This cannot arise from the extension of parts; for though a guinea may be beat

out

The *distillation* of most vegetable substances furnishes a proof of *this theory*, if we are to give that name to the *simple declaration of a fact*.

The play of affinities is still more complicated in those plants which contain AZOTIC AIR, as the cruciform plants, and in those which contain PHOSPHORUS; but as these substances enter into combination only in a small quantity, they do not produce great changes, at least apparently, in the phenomena of distillation.

It appears, in the first place, that the PHOSPHORUS remains combined to the CHARCOAL, which renders it

out to cover a small room, yet will it have *no increase of weight*. Here it evidently has acquired *something*, and the question then naturally presents itself, "*Whence this addition?*"

It is exposed to nothing but WATER, HEAT, and AIR. It without doubt procures,

1. HYDROGEN from the water.
2. OXYGEN from the *same*, and likewise from the *decomposition* of
3. CARBONIC ACID AIR, which it imbibes. Vide page 29, note *.

The *moisture* of the atmosphere may also supply some portion of WATER, to be decomposed and adjusted to the other principles.

As large quarries of marble, and whole mountains, are formed from the exuviz or shells of marine animals, so here do we see that the most solid oaks, &c. arise from the WATER of the earth and atmosphere, and the FIXED AIR thrown off from the combustion of the body, and other organized substances. These truths, equally new as they are simple, recal us to the FIRST CAUSE, who, by differently combining a few simple bodies, has infinitely diversified the nature and appearance of things. Some years back, and this doctrine would have been looked upon as the dream of a visionist, so opposed is *true philosophy* often to the ordinary conceptions of mankind!

fixed.—As to the AZOTIC AIR, it unites with the HYDROGEN, and forms VOLATILE ALKALI*.

Animal matters being compounded nearly of the same principles as the cruciform plants, give nearly the same results in distillation; but as they contain more HYDROGEN, and more AZOTIC AIR, they furnish larger quantities of OIL and VOLATILE ALKALI.

In vegetables and animals possessing life, there is an express organization of parts, which evidently appears to have been designed by the SUPREME INTELLIGENCE for the purpose of uniting the powers of mechanism to those of chemistry. In this point of view, we may consider the solid and consistent parts of vegetables and animals as composing an apparatus for performing a number of CHEMICAL PROCESSES with the fluids that circulate through them†. It is true, indeed, that this whole series of operations is, for the most part, performed with such a minute set of vessels; at the same time that the principles applied to each other, to exercise their respective chemical attractions, seem in general to be so powerfully

* Vide Part I. p. 27.

† That the living organized machinery accomplishes all these miracles, as they seem to us, we have a beautiful example in the process of ENGRAFTING, where

powerfully influenced by the vital principle, that in the present state of our knowledge, we can scarcely proceed farther than to assert, that the effects are really produced by an application of the MOST SUBLIME CHEMISTRY: but these difficulties ought rather to encourage than depress our attempts to arrive at a more intimate knowledge of the powers of nature.

In the healthy living body the balance of principles is constantly kept up, by the surface discharging the superabundant AZOT and the useless AQUEOUS FLUID (hydrogen and oxygen), AMMONIACAL SALTS (azot and hydrogen), and PHOSPHORIC ACID (phosphorous and oxygen);—

where the four juices of a CRAB, by passing through the chemical apparatuses of the engrafted part, is made to produce the most delicious FRUITS. So in the animal world, the spur of a cock being taken off by JOHN HUNTER, and engrafted (if I may be allowed the expression) in the forehead of another bird, the juices of the latter, by pervading it, gave it life and growth.

Are we staggered, that a few principles, differently modified by chemical processes, should produce such an immense variety? Here let me remind the young student in philosophy, that 1 part OXYGEN, with 4 parts AZOT, loosely combined and suspended by CALORIC, is atmospheric air, and that 4 parts OXYGEN and 1 part AZOT, in a state of combination, which may be easily effected, by passing the electric fluid repeatedly through a jar containing these proportions of the two airs, suspended by CALORIC, is nitrous air;—that the former, blended with WATER, is the beverage of common life, the element designed for fish—whereas the latter, combined with WATER, is AQUA-FORTIS, which corrodes and destroys every thing; so much do the nature of things depend on the proportions and combinations of the FIRST ELEMENTS. Vide note *, page 385.

by

by the lungs throwing off CARBON and HYDROGEN, and the blood in the lungs and the absorbents of the skin taking into the system VITAL AIR (*oxygen and caloric*); while the lacteals of the intestines imbibe all THESE SEVERAL PRINCIPLES. The just balance of these principles in the body constitutes HEALTH and LIFE, or, more properly speaking, is the condition necessary for the maintenance of LIFE.

When the balance gets broken, a loss of HEALTH or DEATH ensues.

We are now to investigate, as far as we are able, "the condition of the body when deprived of the IRRITABLE PRINCIPLE, by the venom of the viper, opium," &c.

The diminution of irritability in the muscular fibres, in those animals bitten by the VIPER, is occasioned without doubt by the destruction of the right balance of the principles in the system.

The blood partly dissolved, and partly coagulated,—from being red becomes black or brown,—from being a bland fluid contained within numerous vessels, it becomes a perfect caustic, which dissolves the texture of the containing vessels, passes through their coats, and sheds itself in the adipose membrane, corrupting and decomposing whatever it meets with.

The part in which the wound has been inflicted passes, in the shortest time, into the strongest putrefaction, and presents a perfect gangrene and spacelation.

The skin is speedily corroded and livid, and the muscles become black and fætid.

I have known a rabbit die in less than three hours, with the *muscles* of the leg already gangrened throughout their whole substance; they were *black* and *offensive*, and were divided by a knife without any resistance. After death the flesh was *softened* so much as to crumble at the least touch, and even without violence fell from the bones. Upon opening its body I found the blood in all the cavities of the heart *black*, and often coagulated*; but the most remarkable change was in the *lungs*, which was filled with *black* blood, and exhibited every where *livid spots*.

This *black appearance* of the blood, especially in the lungs, would lead one to suppose, that the *oxygen* of the blood, which we have before shewn gives it its *crimson colour*, had entered into some new state of combination, and with it the *irritable principle* itself was fled.

We will now see how it affects the blood when drawn from an animal.

* In this case the *irritable principle* in the blood was not *wholly* destroyed, for when *that* is the case it is *fluid*. See page 392, line 3.

I let fall, says FONTANA, into a small conical glass, *three drops* of the venom of the viper, and *twenty drops* of the blood that flowed from the neck of a fowl, into which I had made an incision. I reclined the glass, and shook it circularly for ten seconds, that the venom and blood might mix well together.

At the same time I let fall into a similar glass, *twenty drops* of the blood of the same fowl, in the same state as the last. I shook the glass, as I had done on the preceding occasion, that, the venom excepted, all circumstances might be alike.

At the end of two minutes, *the blood unmixea* with the *venom* COAGULATED, and was of a FINE VERMILION COLOUR.

On the contrary, the *blood united* to the *venom* was BLACK and FLUID.

I repeated this experiment next on the blood of a Guinea pig. The *venomed blood* at the end of twenty-four hours was still BLACK and DISSOLVED, whilst the *other* COAGULATED in less than two minutes, and continued to preserve its BRIGHT RED COLOUR.

The *venomed blood* did not harden, but it dried by degrees, and split into scales, and preserved its BLACK COLOUR till the last; instead of which, *the blood* in its

natural state still continued *RED*, even after it had dried and split.

It is the same with **VEGETABLE POSONS**. We find that the flesh of animals which has been cut with a knife dipped in the juice of napei, instantly becomes more *tender*, and fitter for culinary purposes. Travellers inform us that in both **INDIES**, as well as in **AFRICA**, the inhabitants usually hunt with *poisoned arrows*, and that in the space of six minutes, or more or less, according to the degree of the poison's activity, these arrows kill the largest animals, such as lions, tygers, and even elephants. They likewise observe that the flesh of these animals immediately *softens*, and becomes *tender*; an unequivocal proof that all these poisons equally dispose the flesh to a speedy putrefaction, by a destruction of the proper balance or adjustment of the constituent principles.

I procured, says FONTANA, by favour of Dr. HEBERDEN, the poison with which the Americans fatalize their arrows, called **TICUNAS**.

I put into the syringe, for the first experiment, *four drops* of an aqueous solution, which scarcely contained *half a grain* of the dried poison. Having introduced the point of the syringe into the jugular vein of a large rabbit, I perceived the liquor to flow back on the moment

of my pushing the sucker, owing to its not being exactly fitted to the sides of the syringe: I observed to the persons present, that the experiment had failed, but was surprised to hear in reply, that *the animal was dead*. I do not think ten seconds passed betwixt the time of the liquor's flowing back, and the death of the animal, which had actually taken place. I cannot estimate the quantity of poison introduced into the blood, but as the animal died, some must necessarily have found its way thither: had not this happened, I should have supposed, from the quantity which flowed back into the tube, that not a single drop of it had entered the jugular vein.

Having put my syringe in better order, I introduced, says he, *two drops* of water, with which I had previously mixed about *a quarter of a drop* of the aqueous solution of the poison I have spoken of. I scarcely began to inject this liquor by the jugular, when the rabbit fell, without motion and without life, as if struck by lightning. I do not think *half a drop* was introduced.

The death of these animals was *more sudden* than in the cases of introducing in a similar way the venom of the viper into the blood; and the whole body was *more sunk and relaxed*, the limbs being rendered as *pliant* as in animals that have been dead a long time. In animals

bit by the viper, the blood is often coagulated in the vessels, and partly fluid; in those destroyed by the ticunas it is always *fluid*. As the *coagulability* of the blood is governed by the same laws as the *irritability* of the fibre*, this is what we might expect; and we find also, that the venom of the viper cannot overcome the irritability of cold blooded animals, whereas the poison of the ticunas is *fatal* to almost every species of animal†. The muscles of the animals who are killed by the ticunas appear remarkably *pale*. The blood in the venous vessels near the heart is *darker* than usual, and not *coagulated*. The abdominal viscera is not sensibly changed. But I observed, says FONTANA, a great change in the *lungs*, a viscus very essential to life. I generally found it more or less *spotted*; the spots were frequently *very large* and *fluid*. This change in so noble an organ deserves the utmost attention. It was nearly the same with respect to the

* Vide page 353, line 3.

† Except the viper and adder, which are *peculiarly* tenacious of life. Adders and vipers may be cut into pieces, and so tenacious are they of life, that each part will remain for a long while *irritable*. This principle is so predominant in their nature, that few poisons are able to overcome it. Some adders, upon the application of the ticunas, seemed indeed, however, less lively than usual, and the hinder part of the body, which was wounded, became *benumbed*, and *lost* its *natural motion* in a sensible degree, and that for several hours; but none died from this poison.—FONTANA.

venom

venom of the viper *. The air within the cells was very visible through the external membrane, when examined with a microscope; and upon a puncture being made, it escaped through the opening.

I next wished to examine, whether the American poison produced any sensible alteration in the blood of animals, if mixed with it on its issuing warm from the vessels.

For that purpose I cut off a pigeon's head, and received the warm blood in two small conical glasses a little heated, about eighty drops in each glass. In one of them I put four drops of water, and in the other four drops of an aqueous solution of the ticunas, containing scarcely a grain of the dried poison. I shook each of the glasses for a few seconds, so as severally to unite their contents: in two minutes the blood mixed with the simple water was *coagulated*; that with the poison did *not coagulate*, but became of a considerable *darker* colour, and in three hours was still in a fluid state, whilst in the other glass the serum and coagulum were distinct.

To have no doubt on this subject, I then tried this poison on parts that are known to possess *no irritability*;

* Vide page 390.

and

and I found, says he, that the tendon of a muscle being venom'd did not produce the disease of this poison.

I then applied the tunicas to the *nerve itself*, but in whatever way the experiments were diversified, it does not produce under such trials any derangement in the economy of the living animal.

I next separated the *nerve* going to the thigh, so that the nervous influence was destroyed: but the venom applied to the muscle of the leg, nevertheless, extended its influence over that limb to the rest of the body.

The AMERICAN POISON then agrees with the VENOM of the VIPER, in being quite *innocent* to the *nerves* and *tendons*, in whatever way it be applied to them; but, like the viper's venom, it kills in the smallest quantity, if introduced into the *blood* by the jugular vein, or applied to a *muscle*; and its action must therefore be altogether on the IRRITABILITY of the system.

It would be a curious investigation, at the present time, to enquire, "*Whether those aerial bodies, which do not impart OXYGEN to the blood, produce somewhat similar phenomena with the above poisons, which have been proved to destroy THE IRRITABLE PRINCIPLE;*" if so,

we should obtain some ground for the belief "*that oxygen is the principle of irritability.*"

In the work of the celebrated TISSOT of Geneva, on the nerves, we find him hesitating much in admitting that *unrespirable facitious airs* kill by destroying the IRRITABILITY of the heart and muscular fibres. "One of the greatest modern naturalists," says he, "thinks that their fatal effects are to be explained on this principle; but by what conveyance can their powers reach the heart? How can *fixed air* kill this way, since, when taken into the stomach, or applied to the muscular fibres of the intestines, it revives their action, and awakens as it were the very principles of life?"

FONTANA endeavours to overcome this difficulty, by saying that TISSOT ought to have had recourse to *experiment*, to which an authority of so great weight as this benevolent and able physician's is but too capable of preventing an application. The difficulty here opposed is, that we do not know the channel by which *mephitic airs* deprive the heart of its IRRITABILITY. But it must be acknowledged, continues FONTANA, that the ignorance of *one truth* does not exclude the knowledge of *another*; and that we may know the effects, and that it is so, without understanding the cause, and still less their

manner of acting. The question is reduced to this, to determine by experiment, "*Whether these mephitic vapours destroy, or do not destroy, the irritability of the heart;*" and the difficulty proposed above is of no weight, whether we know or not the way in which this is brought about, provided the experiment be certain, and the illustrious writer oppose nothing which disproves it.

In consequence of these considerations, I formed to myself, says FONTANA, a resolution to try different mephitic gases, and to examine their effects on living animals. I was assisted by CAVALLO, in company with other philosophers. The result of all our experiments demonstrated, *that mephitic vapours kill animals, by destroying the IRRITABILITY of the whole muscular system.*

In one experiment I placed a frog in *unrespirable air* (such as does not impart OXYGEN to the blood). It died almost instantly, after making a few leaps, and being violently agitated. I opened, and found all its parts *flaccid and relaxed.* The *heart* still moved, but *feebly*, and with *great difficulty*, and in a short time entirely lost these slight remains of action. I endeavoured ineffectually to *irritate*, not only *that*, but likewise the *other muscles*; neither of them would contract. I forced a
needle

needle into the spinal marrow, and saw, with surprise, that it no longer awakened the motion of the limbs. The colour of the *red blood* was also wholly changed to a *brown*.

I placed two frogs beneath a glass recipient, into which I had introduced the gas obtained from a solution of iron-filings in the nitrous acid. They also died instantly. I opened them, and found the *arterial blood* of a *brownish blue*, and collected in the auricles. The *heart* was no longer in motion, and was *insensible to stimulations*. The flesh was thoroughly *flaccid*, and had lost *all irritability*. On pricking the *crural nerves*, the leg remained *motionless*.

The illustrious GIRTANNER injected into the jugular vein of a dog a small quantity of *azotic air*. The animal died in twenty seconds. Upon opening the thorax, the pericardium, and the heart, the right auricle and ventricle were filled with *black blood*. The left ventricle was of its ordinary dark colour. The *heart*, and all the *muscles*, had *lost* their *irritability* almost entirely, and contracted but weakly upon the application of the strongest stimuli, such as the electric spark.

A small quantity of *carbonic acid gas* was injected into the jugular vein of a dog. The animal became sleepy,

and died in about a quarter of an hour. The right auricle and ventricle of the heart were filled with *dark blood*. The blood contained in the left ventricle and auricle was of a *deeper colour* than ordinary. The *heart* and *muscles* had *lost* all their *irritability*.

This *important subject* demands more *comparative experiments*, and made expressly for this purpose; and we could wish that a distinguished physician, who first brought this subject into repute in ENGLAND, would examine into it minutely, and extend this principal branch of modern medicine. We do not here demand fresh, sublime, and abstracted theories, which a singular effort of genius gave birth to: we are in need of nice observations; new and well-imagined experiments; direct and useful inductions, drawn by a calm mind, and one capable, like his, of assembling and combining in the best manner the most luminous particulars.

I cannot forbear mentioning in this place the singularity of a small microscopical animal, which LEWENHOECK has named *Rotifer, wheel-polypus*. It is a small gelatinous worm, commonly found in the earth or sand collected by rain in the tops of houses. I have likewise found it in other earths, as well as in waters that have been some time stagnant, and more frequently again in those

those that have a gentle current, and are filled with conferva, and other aquatic plants. This worm is divided towards its head into two tolerable sized trunks, which appear like two stars, from the number of small, extremely sharp, and short branches, which project from it. They really appeared to LEWENHOECK to be wheels of a rare mechanism, and every one would judge the same on seeing the creature put them in motion. But a more exact observation at length convinced me, that they are not wheels, but a quantity of moveable arms regularly planted all around the two trunks. It moves these one after another with so great celerity that the eye fancies it sees absolute wheels: but to be certain of the contrary, it is only necessary to place it betwixt two pieces of glass, and then observe it a long while together with an excellent microscope. In swimming it strikes the water with these arms or branches with incredible celerity, rests itself at different periods, and thus transports itself from one place to another. When it eats, it, on the contrary, fixes its tail in some substance, and afterwards turns its two wheels, giving such a motion to the water, that it directs the course of it towards its head, so that it presents to its mouth all the small corpuscles with which stagnant water abounds.

The

The *wheel-polypus*, I have spoken of above, loses when dried every kind of motion and appearance of life, and recovers both the one and the other when again put into water. I placed one of them on a bit of glass, which I exposed, during a whole summer, to the noon-day sun: it there became so dry, that it was like a piece of hardened glue. A few drops of *water* did not, however, fail to restore its motion and life. Lastly, I left it, by way of experiment, in a very dry soil, and exposed, during the summer, to the whole heat of the sun for the space of two years and a half. I afterwards returned it again into *water*, where, at the end of two hours, it recovered life and motion. The *water* appears in this case to be *decomposed* when it comes in contact with the animated fibre, the *OXYGEN* it contains combines with the fibres of the *rotifer*, restores its *irritability*, its life, and organic motion, of which it had been deprived by the excessive stimulus of heat, to which it had been so long exposed.

The microscopical eels that are found dry and withered in smutty wheat, recover motion and life as soon as they are wetted with a little *water*, and again become lifeless and dry, whenever they are no longer exposed to *water*. I have repeatedly assured myself of this with an extreme pleasure. Thus then do they preserve the
power

power of reviving and resuscitating effectually, by the simple presence of the *water* with which they are moistened.

The celebrated BONGUER, in his work on the shape of the earth, relates to us, from the testimony of Father GUMILLO, a jesuit, that a large venomous snake is found in *Peru*, which being to appearance dead, and dried in the open air, or in the smoke of a chimney, has the property of coming again to life, on its being exposed for some days to the sun in a stagnant and corrupted *water*.

I have dried, says FONTANA, the worm called *seta equina*, or, according to LINNEUS, *gordius*, several times in the open air, without leaving it there too long: it had lost almost all its bulk and weight, and was become like a bruised and dry straw: its skin had shrunk so as to leave no sensible cavity, and it had no longer any sign of life and motion. I returned it into *water*, where, in less than half an hour, it recovered its bulk and weight, and soon afterwards discovered unequivocal and permanent signs of life. I have since found a number of other small animals, either on the tops of houses, in earths, or in water, which, in the same way, alternately lose and

recover

recover the use of their organs on being dried, and afterwards returned again into *water*.

The physician ought not, however, to confound with each other these two different states; that is to say, the putrefaction of the parts, and the desiccation of the organs. In the first the animal is dead for ever; in the second it may yet again return to life. We do not know any power, Nature herself does not disclose any, that can recompose an organ that is destroyed and entirely decomposed and putrid. This is what has never yet been accomplished or seen. We have therefore every possible reason, not only to believe an animal that is reduced to this state *dead*, but likewise to believe it dead for ever. But if the animal is simply dry, if there is no physical disease in its organs, if the component particles of the different parts still preserve their respective situations, the animal may in this case very well return to life; to which effect it is only necessary that the organs receive a sufficient degree of *OXYGEN*, which we know to be the principle of *irritability* and of *life*.

We have yet a stronger evidence of the doctrine advanced in this Section from the following experiments with the venom of the viper.

I pierced,

I pierced, says FONTANA, one of the fore feet of a land *turtle* that weighed four pounds, with an American arrow, which I left there for half an hour. In another hour it scarcely seemed alive, and in two appeared quite dead. After an interval of ten hours, I removed with a sharp instrument the inner shell, taking care that all the fleshy parts should be as little torn as possible. The heart was still, and I scarcely found any motion in the auricles. But to my great surprise, the heart, together with the auricles, *recovered* all their force, and continued in strong action six hours incessantly; the auricles kept in motion two days, that is to say, as long as they moistened by OXYGENATED BLOOD which flowed from the neighbouring arteries.

I then pierced the fore foot of a land *turtle* that weighed a pound and a half with an American arrow. In eight minutes it could scarce move, and in a quarter of an hour was to all appearance dead. When the feet and neck were stimulated, they discovered a slight degree of sensation. Having opened the thorax, I found the heart and auricles quite motionless. I touched the heart thrice, and it contracted itself once each time. On freeing it from the membranes, it began to move very briskly, and continued to do so for several hours. I

covered it with the inner shell, and in twenty-four hours found it again motionless. I pricked it once with a needle, it contracted itself but a single time; I pricked it again, it contracted itself afresh, and continued to do so every time I pricked it. I left it exposed to the *air* for three minutes, and it then began to move itself, continuing a very brisk motion for several hours. I covered it afresh with the shell, and on uncovering it four hours after, found it motionless. I then left it again in the *pure air*, and in a short time, and of itself, it recovered its oscillations, which continued for six hours. I again covered it with the shell, and on uncovering it two hours after, found it without motion. I then covered it with *water**, which I kept on it for ten minutes, without its producing any change. I drained off the water, and the heart was scarcely left in the *air* a minute, when it began afresh to move briskly, and continued to do so several hours.

This succession of motion in the *turtle*, deprived of its **IRRITABILITY** by the poison of the *ticunas*, produced by the simple contact of *atmospheric air*, if it does not

* In this case no decomposition of the water took place; but it proves that it was not *moisture* in the first experiment that re-excited the movements of the heart.

decisively

decisively prove that the IRRITABLE PRINCIPLE is derived from the OXYGEN of the *air*, it nevertheless goes to prove, that *the air* is a very *active principle* in *awakening* the IRRITABILITY of the *muscular fibres* and of the *heart*, as was maintained in Section XXXII, page 340.

definitively prove that the irritative principle is derived from the oxygen of the air, it nevertheless goes to prove, that there is a very strong tendency in causing the irritability of the system from and of the heart, as was mentioned in Section XXII. page 340.

SECT. XXXVII.

LAW III.

A DEFECTIVE STIMULATION OF ANY ORGAN ACCUMULATES IRRITABILITY IN THE MOVING FIBRES.

THE *blood vessels*, the *absorbents*, the *stomach*, and *intestines* (which might, without much impropriety, be called HOLLOW MUSCLES), are in *constant action* from the *stimuli* appropriated to them. The LOCOMOTIVE MUSCLES, when not acted upon by the *nervous electricity** darted into them by the will, are nevertheless in *constant action*, as is seen in the tremor of old men, in the palsy of the head, and from the contraction of antagonist muscles, when those which counterpoise them are cut through, or lose their action (called by HALLER

* The *celerity* of *electricity* keeps pace with the *celerity* of *volition*, and therefore seems peculiarly adapted to explain the phenomena of the nervous system. When LOUIS the XVth, from a motive of curiosity, commanded a battalion of 2000 men to stand hand in hand, to receive the electric circuit through their bodies, the last man felt the shock at the same instant with the first. So in the act of volition, the moment the mind wills the hand to be moved, it is moved; but without our being conscious of the manner how; because it was not necessary we should know it was done by the mind directing the nervous electricity into the moving fibres of the part. Vide Part I. Sect. XII.

their

their *vis insita*), from a paralytic affection. Vide note*, p. 128.

The IRRITABLE FIBRE therefore, from the moment of its existence to that of its dissolution, being constantly surrounded by principles which act upon it, and stimulate it, and upon which it re-acts; it follows, that during the period of its existence, the IRRITABLE FIBRE is in continual action; that its existence consists in action, and that it is not in a passive state, as some authors have asserted.

The continued actions going on in organized animated beings expend the IRRITABLE PRINCIPLE in the fibre, whether that be oxygen derived from the blood, electricity, or some as yet unperceived power in the fibre.

If the supply of the IRRITABLE PRINCIPLE to the moving fibre, be equal to the expenditure by the action of stimuli, the fibre is then said to be in a state of TONE.

If the expenditure exceed the supply of THIS PRINCIPLE to the fibre, it is said to be in a state of EXHAUSTION.

But if the supply given to the moving fibre exceed the expenditure, the fibre is then said to be in a state of ACCUMULATION.

SECT.

SECT. XXXVIII.

OF COLD.

DURING the winter, by the absence of the stimulus of heat, and in part of light, plants and many animals become torpid, the organs of circulation, and of nutrition, perform their functions but languidly, and life itself appears suspended. In consequence of the diminished action of these stimuli, THE IRRITABILITY accumulates, and manifests itself at the return of spring. A slight degree of heat then produces powerful effects upon the fibres thus delicately irritable. Animals, which had concealed themselves under ground, even when the cold is greater than in autumn, venture forth from their subterraneous retreat, trees and plants put forth their leaves and blossoms, and birds, and animals, and man himself, is sensible of the stimulus of heat from the return of spring, his fibres being rendered more irritable by the winter's cold.

DR. HALE, in his *Vegetable Statics*, relates that he cut down a vine, and cemented to its mutilated stump glass tubes, each 7 feet long, and one-fourth of an inch diameter,

diameter, with brass caps, by which they were screwed on one above another, till they rose to the height of 36 feet.

By these gages it appeared,

1st. That the *sap* began visibly to *rise* MARCH 10, when the thermometer by day stood only at 3 degrees above the *freezing point*;

2dly. That, APRIL 18, it was at its *height* and *vigour*;

3dly. That from *that time* to MAY 5th the force *gradually decreased*;

4thly. That it constantly rose *fastest* from sun-rise to about 9 or 10 in the morning, and then *gradually subsided* till about 5 or 6 o'clock in the afternoon;

5thly. That it rose *sooner* in the morning after *cool weather*, than after *hot days*, and in proportion to the *coldness* of the *night* and *subsequent heat*;

6thly. That after *several successive cold days* and *nights*, the *sap* would rise during *the whole day*, if it chanced to be *fine*, although *slowest* at *noon*.

7thly. That if warm weather had made the *sap* flow *vigorously*, that *vigour* would be *abated* immediately by a cold easterly wind and a cloudy sun,

when the sap would *sink* at the rate of an inch per minute; but when the sun shone out, and the wind shifted, it rose again as usual.

8thly. The OLDEST VINES were *soonest* affected by a change of temperature, and in them the sap *first* began to *sink*.

9thly. And, on the contrary, when the tube was fixed to a very short stump of a YOUNG VINE, and at only 7 inches from the ground, the sap flowed *incessantly*, and *fastest* of all, in the *greatest* heat of the day, *sinking* only after *sun-set*.*.

He then makes this *general conclusion*, that the rapidity with which the sap circulates in the vine during SPRING is *five times greater* than the *rapidity* with which the blood flows in the *arteries* of a horse, that it is *considerably slower* in the SUMMER than in spring, very *languid* in AUTUMN, and *ceases altogether* in the WINTER.

The above experiments clearly demonstrate, that it is

* This last observation is very valuable, and exactly applies to the human frame. If a child or an old man take the strong stimulus of opium or wine, an *exhaustion* of the irritability of the fibre ensues, as is shown in page 367; but if the same quantity be given to a person in the vigour of health and life, it seems to call forth the irritability of the fibre without exhausting it, and the actions of life become increased, and sleep does not take place before the customary hour. This will be further illustrated page 417 and 418, on the different Effects of the Cold Bath on strong and very weak Constitutions.

not

not from *heat* and *light* alone that the sap rises in the vine, for if that were the case it would *increase* as the heat increased, it would be greatest in the *noon-day* and in the *height of summer*, and *less* in *spring* than in *autumn*, whereas the reverse is here shewn to be the case. It must therefore depend on the *IRRITABILITY* of the fibre, which gets *exhausted* by the stimulus of *heat* and *light*, and is *accumulated* by its *absence*.

In the same way the *IRRITABILITY* of the *bedysarum gyrans* is exhausted by the heat of the noon-day sun; and, according to the experiments of FONTANA it is proved that the *IRRITABILITY* of the *sensitive plant* is great in the morning, *diminished* during the *heat* of the day, and *little or none* in the *evening*.

Hence it is that the return of *cold* and *frost* in the *spring* is so *noxious* to vegetables, and that this season is *forward* according to the severity of the preceding winter.

FONTANA observed, that during winter the *vipers* which he kept for his experiments were in a *torpid state*, though the thermometer was at 59 degrees. He endeavoured to render them vigorous by *warmth*, and exposed them to a heat of 67 degrees only. *In two minutes they died*, though during *summer* they bear a *much greater*

degree of heat, without the least injury; but then they are less irritable.

SPALANZANI observed the *newts* bury themselves in the earth, and become torpid, in the month of *October*, before the thermometer in the shade falls to 54 degrees; and that they re-appear in the month of *February*, though at that time it freezes during every night, and not unfrequently during the day the thermometer is many degrees below 54.

"What is the reason," enquires this excellent observer, "that these animals revive in *SPRING*, when the cold is more intense; and sink into torpidity at a much less degree of cold in the *AUTUMN*?"

I will solve this problem, by observing that in *AUTUMN* a very great stimulus is required to act upon the fibre of these animals, exhausted as it has been by the heat of the summer; but in *SPRING*, the least stimulus, the least increase of heat, is sufficient to put the fibre into action, its irritability having accumulated during winter in consequence of the absence of the common stimuli.

Thus precisely is it with the *vegetable* tribe, for they sleep in winter, and are awakened by the vernal sun; but die, if too powerful a heat be suddenly applied.

On

On this principle we may account for the destruction of plants by *blight* in summer; for unless there be *frost* at night there is no blight; and it may be remarked, that the blight does not take place during the action of the *frost*, but at the rising of a *cloudless sun*.

Hence it is that our garden crops, such as French beans and peas, which usually suffer most by blight after a frosty night in summer, suffer no injury if they are watered immediately before the rising of the sun, because the evaporation abates the heat.

The effects of winter are therefore very great in cold climates, because the accumulation of the *irritability* is in proportion to the abstraction of the stimulus of heat.

In LAPLAND corn ripens in 60 days, whereas in FRANCE it requires 120 or 160 days. The truth of what is here advanced may be proved by exposing vegetables *alternately* to *heat* and *cold*: it is surprising how much their growth and the power of vegetation is increased. But in these experiments care must be taken to vary the temperature by degrees; because the *irritability* accumulating in the fibre by the abstraction of the heat, a very small quantity of this stimulus *then* applied is sufficient to exhaust it entirely, or to destroy it.

SECT.

SECT. XXXVIII.

THE MANNER IN WHICH COLDS AND INFLAMMATORY FEVERS ARE PRODUCED.

ON going into a *cold bath*, suppose at 33 degrees of heat on Fahrenheit's scale, the action of the capillary arteries of the skin is *diminished*, or ceases for a time. Hence less or no blood passes these capillaries, and paleness succeeds. But soon after emerging from the bath, a more florid colour, and a greater degree of heat, is generated on the skin than was possessed before immersion; for the capillary arteries, after their quiescent state, occasioned by the want of stimulus, become *more irritable* than usual to their natural stimuli, owing to the *accumulation* of irritability, and hence a greater quantity of blood is transmitted through them, and in consequence a greater degree of heat succeeds. Besides the *quiescence* of the minute vessels of the lungs, there are many other systems of vessels which become torpid from their irritative associations with those of the skin,

From the *quiescence* of such extensive systems of vessels as the capillaries of the skin, and the minute vessels of the lungs, with their various absorbent series, a great *accumulation* of *irritability* is occasioned; part of which is again expended in the increased exertion of all these vessels, with an universal glow of heat in consequence of this exertion, and the remainder of it adds vigour to both the vital and voluntary exertions of the whole day.

If the activity of the subcutaneous vessels, and of those with which their actions are associated, was too great before cold immersion, as in the hot days of summer, by which the *irritable principle* was previously *diminished*, we see the cause why the cold bath gives such present strength; namely, by stopping the unnecessary activity of the subcutaneous vessels, and thus preventing the too great *exhaustion* of the *irritable principle*.

In those constitutions where the degree of *irritability*, or of debility, is greater than natural, the coldness and paleness of the skin, with the quick and weak pulse, continue a long time after the patient leaves the bath; and the subsequent heat approaches by unequal flushings, and he feels himself disordered for many hours. Hence the bathing in a cold spring of water, where the heat is

but

but 48 degrees of Fahrenheit's thermometer, much disagrees with those of weak or unirritable habits of body; who possess so little of the *irritable principle*, that they cannot without injury bear to have it diminished even for a short time; but who can nevertheless bear the more temperate coldness of Buxton baths, which is about 80 degrees of heat, and which strengthens them, and makes them by habit less liable to great *quiescence* from small variations of cold, and thence less liable to be disordered by the unavoidable accidents of life. Hence it appears, why people of these unirritable constitutions, which is another expression for a defective irritability, are often much injured by bathing in a cold spring of water; and why they should continue but a very short time in baths which are colder than their bodies; and should gradually increase both the degree of coldness of the water, and time of their continuance in it, if they would obtain salutary effects from cold immersions†.

One RICHARD EDWARDS, of *Liverpool*, a healthy young man, twenty-eight years of age, with black hair and a ruddy complexion, went into some fresh water, which was about the temperature of mild weather, viz. about 40 degrees by the thermometer. He continued

† Dr. DARWIN. Vide note *, page 413.

in this water 34 minutes, and then went into a *warm bath* at 90 degrees.

Here for the first moments he felt very warm, but his hands and feet gave him pain, and in two minutes, being still in the warm bath, he was seized with *shiverings*. The water was now increased in heat 6 degrees, but our experimentalist still felt cold; the heat was further increased 10 degrees, and after remaining in the warm bath half an hour, he came out sick and very languid, his pulse was quick and feeble. He passed a very feverish night, and the next day had wandering pains over his body, with great weakness resembling the *incipient stage of a fever*.

Now it can make little difference whether a person pass from *cold air* or *cold water* into *warm air* or *warm water*; and I have often seen, says Dr. BEDDOES, persons who had long been riding in the cold and wet, experience the *first symptoms of fever* upon coming into a *warm room*, sitting *near the fire*, and *drinking spirits*. After riding in the rain until I have been thoroughly soaked, I have always experienced, says he, a glow, as if my skin had been on fire, merely from putting on dry clothes, and the exertion attending the change of dress. At the same time I have
felt

felt within my nostrils the dryness and heat that is perceived at the beginning of a cold, which however I have escaped by keeping *cool* and *quiet* for a time. I have known this exactly to be the case with others; and I have made the observation so often, that I am certain I am right.

A patient lately mentioned to me, says this ingenious physician, among the particulars of her complaint, a circumstance which seems, both on account of its singularity, and the illustration it affords of an *important principle* in animal nature, to be worth recording. Her constitution was one of those, where a small irregularity in diet, exposure to cold, &c. produced pain and disorder in the bowels, sometimes arising to a severe fit of the colic. The patient having one day occasion to wash some butter, conceived that by removing her hands occasionally out of the *cold spring water* into *warm water*, she should have a better chance of escaping the accustomed complaint in her bowels. She accordingly heated some water as hot as she could well bear it, and from time to time transferred her arms out of the *cold* into the *hot water*, immersing them pretty deep in the latter. It was on a Saturday in spring: the next morning she was awakened by violent pain under each axilla, and

was

was likewise sensible of a considerable swelling under each axilla. The inflammation continued, and by Tuesday morning the tumors had increased to the size of a twopenny loaf each. They soon afterwards broke, and discharged a large quantity of pus. In about a fortnight both wounds were healed. These circumstances indicate a true *phlegmonic inflammation*, which I suppose may be safely ascribed to the *alternate action of heat and cold*.

Mr. CLARKSON, in his Essay on the Impolicy of the African Slave Trade *, informs us, that when slaves are brought on board, the seamen, to make room for them, are turned out of their apartments, and sleep for the most part on the decks, from the time of their leaving the coast of *Africa* (where the days are *excessively hot*, and the dews *excessively cold and heavy*) to their arrival at the *West-India islands*. From this bad lodging, he proceeds, and this continual exposure to *colds and damps*, and *suddenly* afterwards to a burning *sun*, *FEVERS* originate, which carry many of them off! This fever attacks the whole frame: but the eye commonly feels the inflammation most. The inflammation of the eyes ter-

* Vide Part I. page 54, 55, and 56.

minates either in disperſion or ſuppuration : in the firſt inſtance the eyes are ſaved ; in the latter they are loſt.

The inflammation of the eye is not the only diſeaſe produced in EGYPT by the ſucceſſion of *hot days* to *cool nights*, where it is the cuſtom to ſleep during the ſummer in the open air, any more than on board our ſlave ſhips ; as the reader will find upon recurring to Alpinus and the later travellers. In both ſituations cauſes and effects run parallel. The well known danger of expoſure to *dews* in *hot climates*, and indeed in all climates, in certain caſes, ſeems to depend on the ſame principle. It is alſo probable that the *heat* of the *preceding day* enables the *dews* of the *night* to prepare the ſyſtem for the *ſtimulating effects* of the *heat* of the *ſucceeding day* ; ſo that of two perſons who ſhould expoſe themſelves without precaution to the *cold* of the *night* and the *heat* of the *following day*, he who ſhould have been moſt *exhausted* the day before by the *heat*, would, if other circumſtances could be rendered alike equal, be moſt injured by the next alternation.

Thus when any part of the body has been expoſed to *cold*, it is liable to be much more affected by heat and other ſtimuli than before the expoſure. Of this the method of treating *frozen limbs* in cold countries affords a beautiful

ful and decisive proof. Were a frozen limb to be brought before a fire, or immersed in warm water, a violent inflammation would come on, and speedily terminate in mortification. They therefore take *snow* to rub the parts benumbed with cold, and very gradually expose them to a warm temperature. This custom universally obtains in all the northern climates, where the rude inhabitants possess a method of relief that might do credit to the ingenuity of more enlightened nations, and such as is not unworthy of their imitation! The pungent pain felt upon holding an hand much chilled to the fire, is another exemplification of the same principle, which seems, says Dr. BEDDOES, to be one of the most general laws of animal nature.

Now after the application of cold, which, according to circumstances, produces a greater or smaller diminution of the actions of the living system, and at length sleep itself, there may be an infinite number of gradations between a *fatal inflammation* and a *transitory glow*, and this according as the previous cold and the subsequent heat have varied in intensity;—but whatever be the degree, the effect depends on the same principle*.

By respiring a *cold atmosphere* the same thing happens to the nostrils, fauces, lungs, as to the external surface

* Dr. BEDDOES.

of the body upon going into a *cold bath*; and if we pass suddenly from *such an atmosphere* into a *warm room*, what happens to the skin will in some degree happen to the membrane lining these cavities; a *glow* or *inflammation* will ensue, according to the difference between the two temperatures and the length of time passed in the cold.

When the application of cold or moisture to a superficial part only is succeeded by an *inflammation* of the respiratory cavities, the consent of the whole system easily explains this remote local affection. The cause of disease pervades at once, and feels as it were, or searches the whole body, but affects only in a degree to draw our notice to the organ which from habit or structure is *most tender*. Should any other part, from previous circumstances, have been rendered more sensible to its influence, we shall in consequence have either a sore throat, a diarrhoea, a stiff neck, or the rheumatism, in place of a catarrh.

CHILDREN are so susceptible of *inflammation* that a great part of the mortality among them is, as far as I have observed and can judge, to be ascribed to the ignorance of mothers and nurses of the power which even a moderate change of temperature, if suddenly made, has to effect their tender and irritable frame.

<i>Names of the Parents.</i>	<i>L.</i>	<i>D.</i>	<i>Names of the Parents.</i>	<i>L.</i>	<i>D.</i>
Marg. Jones	6	3	Samuel Holyhead	4	8
Mary Holmes	4	0	George Highway	8	0
Thomas Sanford	7	4	Constant Richards	3	6
John Smouch	6	6	Mary Walker	3	0
Anne Roberts	3	0	Edward Evans	3	4
E. Felton	7	6	Anne Hughes	4	2
E. Jinks	3	8	Jane Ingram	3	1
R. Richards	1	0	John Hammond	4	2
Robert Pigging	7	1	Elizabeth Smith	3	4
E. Ward	3	2	Mary Richards	2	1
Sarah Colley	4	2	Sarah Richards	6	6
Lucy Clark	3	6	Catherine Harper	5	0
Elizabeth Higenton	4	4	Anne Hutchenson	4	3
Joseph Sonds	3	1	Philip Saunders	4	0
John Holyhead	4	3	Elizabeth Heath	7	1
Thomas Felton	7	2	Mary Ames	7	3
Anne Williams	7	1	Mary Bagnold	4	0
John Smith	5	2	Elizabeth Mansfield	8	1
Joseph Hutchenson	4	0	Elizabeth Evans	4	0
J. Ellis	3	3	Anne Horton	3	0
Elizabeth Poignor	3	0	Thomas Ingram	3	9
Anne Withington	6	4	Joseph Ingram	3	0
Jane Underwood	5	2	Jane Swanwick	5	3
Jane Fields	3	2	John Beeton	4	1
James Ingram	2	2	John Bestick	5	0
John Alkey	5	0	Joseph Heans	6	3
John Smith	4	0			
E. Horton	7	0	55	* Total	224 99
E. Hollinhead	3	5			

This enquiry was made by Dr. BEDDOES, at *Shifnal* in *Shropshire*, where firing is very plentiful and cheap. It was asked of each grown up person there, how many children he had had, and how many were dead? In the first column you have the name of the family; in the next the number of the children alive; and the third the number of the children dead. Whenever accurate registers of the mortality of the human species, in climates equally warm, shall be kept, I expect that not half so many infants will be found to die as in GREAT BRITAIN.

Now

Now which, think you, is the most likely, that there should be something *wrong* in *our management*? or that *three parts in four* of our fellow creatures should, in one of the most airy towns in GREAT BRITAIN, be doomed unavoidably to perish before they come to their full growth, without answering any other purpose than to give trouble and endure pain? If this last be the case, then of all the things in this wide world, the human frame is the worst contrived and executed. And I leave you to judge whether such a supposition stands to reason. If then *our management* of our *children* be *wrong* in any material points, a stop may be put to this *excessive mortality*, for we should have only to find out what these points are, and shape our conduct accordingly. One may with the greater propriety embrace an opportunity of disseminating the knowledge, "how COLDS, FEVERS, and RHEUMATISMS, are caught," as their remote and proximate causes, and the manner in which they are to be got rid of, though in my opinion perfectly ascertained, is far from being generally understood even by the members of the medical profession; and if any person, not belonging to that profession, should suspect this to be a wanton paradoxical assertion, he may find in the case of *opium*, and of the cool treatment of *small*

pox, &c. instances equally striking, where one generation of pathologists passed away after another, without being able, in the case of *opium* *, to perceive the *plainest appearances*, or, in that of *small-pox*, to draw the *simplest conclusion*. So servilely imitative an animal is man! So loath to employ his own powers of perception and thought!

THE sudden, and sometimes severe, changes of weather to which this climate is subject, are perhaps the most unhappy circumstances attending our situation; and the pernicious effects of them upon the human constitution are so frequently experienced, that diseases of the breast may be truly considered as endemical among the inhabitants of this island. We frequently find a *cold* and *keen* day succeeded by one as *mild* as spring or *warm* as summer; or, what is still worse, the forenoon accompanied with a *sharp, dry, biting north-east wind*, and the latter part of the day uncommonly *warm*. It is impossible but this sudden change from *cold* to *heat* must, in

* One cannot compare HALLER's clear and satisfactory parallel of *wine* and *opium*, published in 1769 (El. Physiolog. t. V. p. 610—11.) with CULLEN's perplexed and hypothetical doctrine of *opium*, and his whole article *sedentia*, published in 1789 (Mat. Medica, t. ii. 217, *et seq.*) without a sense of humiliation!—Dr. BEDDOES.

delicate constitutions especially, be productive of mischief.

When alterations of weather from *cold* to *heat* succeed gradually, those salutary powers of accommodation with which the animal oconomy is furnished, may prevent any mischief or disorders, though an alteration in the constitution proportioned to that in external nature must necessarily succeed those changes; but that which might, without inconvenience to the constitution, be produced gradually, will, if too sudden and abrupt, be felt as a disease; as a man may with ease and safety gradually descend a flight of steps, when a sudden jump from them would endanger his life. Thus we bear without injury the *heat* of *spring* after the *coldest* winter, though it must be confessed that disorders take on at that season a more inflammatory appearance.

But where the change is more violent than in the transition from one season to another, as when *Europeans* go to the *East* or *West Indies*, until the constitution becomes accommodated to the climate, the *uncommon heat* to which such persons are exposed, must have a most powerful effect on their irritable frames. Immediately on the arrival of *northern strangers* within the *tropics*, their circulation becomes quicker, their perspiration

tion freer; a lassitude or debility takes place, from the uncommon expence of the irritable principle consumed by the increased actions of the heart and arteries, and the secretions dependant in a great measure on their movements. In short, the pulse is rendered harder, fuller, and stronger. The skin is redder than usual, but especially that of the face, with other signs of general plethora*, to which the fluids from increased absorption certainly contribute, though it chiefly arises from the increased force of the vascular system. In short, more or less of *fever* is kept up, which varies in different people, according to circumstances, continues for an indeterminate time, or until the increased force of the heart and arteries, kept up by the *accumulated irritability* of the system, from the previous effect of *cold*, ceases, that is, until the right balance between the irritability of the fibre and the external stimulus be properly adjusted.

* *HEAT* has the property of *expanding* all bodies: thus a circular piece of iron made exactly to pass through a ring, when heated, will be found too large, and thus the rings on the fingers of those who have passed into warmer climates, will be found, from the increased size of that part of the *body*, too tight. In the *cold fit* of an ague rings are observed to drop off. But the *PLETHORA* here spoken of arises from the increased action of the *absorbents*, as well as the *vascular system*.

But if, on the contrary, we pass from a *warm* to a *cold* climate no such evil effects are observed to take place. LINNÆUS, in a paper in the *Amœnitates Academicæ*, expresses his astonishment at the impunity with which the *beated* LAPLANDER rubs himself with *snow*, or even rolls in the *snow*, and drinks the *cold snow water*. We every day see *horses* in a state of the *most profuse perspiration* freely washed with *cold water*, and always without injury. I have, says Dr. BEDDOES, within these two years caused horses, accustomed to be stabled, to be turned out in winter; and no cough, catarrh, or other disorder, has ever been the consequence. It appears therefore to me, continues this ingenious physician, that within certain limits, and those not very narrow, the transition from a *higher* to a *lower temperature* is attended with *no danger* to animals in a state of tolerable health; and a person, I conceive, might *suddenly pass* from an *higher* to a *lower temperature* without inconvenience, even where the difference is so great as to be capable of producing *considerable inflammation*, if the change should be made with equal celerity in a contrary direction.

It has been before observed, that if you keep *one* of your hands in *cold water* for two minutes; then put *both* hands into *warm water*; and the hand which has been in

the *cold water* first will feel much the *warmer* of the *two*. Or else, handle some *snow* with *one hand*, while you keep the *other* in your *bosom*, that it may be no colder than the rest of your body; now bring *both* within an *equal distance* of the *fire*, and you will feel *how much more* THE HEAT affects the *cold* than the *warm hand*. This would be a *dangerous experiment* were the hand kept *too long* in the *snow*, or if the *fire* be *too strong*. For in some countries where the *cold* is much greater than it ever is in ENGLAND, it is common for people to have their toes and fingers and ears so *frost-bitten* as to lose all their feeling; and should that person *warm* them at a fire, or put them into *warm water*, a VIOLENT INFLAMMATION is sure to come on, and the part *mortifies*. So they are obliged to set cautiously about bringing the part back to its natural feeling, and they rub it hard with *snow*, by which means they recover it in the gentlest and most gradual manner*.

So when a person is out in very *cold weather*, the air, every time he draws his breath, brushes his *nostrils*, *wind-pipe*, and *lungs*; and just as is the case with the *outward skin*, it makes *these parts* more liable to be INFLAMED by HEAT.

* Vide page 422.

If you attend to what not unfrequently happens in coming out of a *cold moist air* into a *warm room*, you will first perceive a *glow* within your nostrils and breast, as well as all over the surface of your body. Soon afterwards, more especially, if you drink warm or spirituous liquors, a disagreeable dryness, or huskiness, will be felt in the nostrils and breast; by and bye a short tickling cough will come on from an increased secretion of the glands of the nose, fauces, and wind-pipe, which being of a sharp nature stimulates the glands to a further increase of secretion, which often occasions a very large discharge of sharp mucus. You will perhaps at first shiver a little; this will make you draw nearer the fire and drink some more brandy and water: but it will be all to no purpose. The more you try to *beat yourself*, the more chilly and uncomfortable will you become, for you have now *caught cold*, that is, you have *brought on* AN INFLAMMATION of *the chilled part*, which is the smooth moist skin which lines the nostrils and goes down the wind-pipe into the lungs, and I wish you, with all my heart, well rid of it, and safe from the complaints which severe colds are apt to leave behind them.

I have sometimes been able to make other persons, says Dr. BEDDOES, attentive to the progress of these phenomena,

phenomena, and nothing has appeared more evident, than that during exposure to *wet* and *cold* no tendency to INFLAMMATION is perceptible, but that *subsequent heat*, *exercise* in the dry, and *stimulants*, produce the *glow* or INFLAMMATION.

By keeping *quiet* and *cool* for some time after being *wet* in summer, and by avoiding a *sudden transition* into a *warm temperature* in *cold weather*, and by *temperance* with regard to diet (rather *abstemiousness*), in *both cases* those INFLAMMATORY DISEASES, for which *cold* only *prepares the system*, may be easily avoided; and any person, by acting upon these principles, may have at pleasure a *slight* or a *violent catarrh*, or *no catarrh at all* *.

* The popular treatment, therefore, of colds during their early stage is just as prejudicial as the ancient *hot regimen* during the SMALL-POX. White wine whey, buttered ale, increased clothing, getting drunk, &c. originated from the supposition, that colds proceed from *obstructed perspiration*, whereas it is found from the very accurate experiments of SANCTORIUS, and our countryman Dr. KEIL, that the *perspiration* is at that time as abundant as at any other. It has continued, because the faculty were, till of late, unapprized of the nature of colds, and from partial success in this dangerous practice, as *perspiration*, when produced, carries off *superabundant heat*. For the fluid that escapes from the body consists chiefly of watery moisture, which uniting with a large portion of sensible heat, is carried off in the form of steam. Hence the more speedy the evaporation, the more sudden is the diminution of heat; or, in more familiar terms, the greater is the degree of cold thus generated. Hence the heaping on of STIMULI in a disease demanding an *opposite treatment*, has oftentimes done good, but it is to be feared, it has not unfrequently done harm, whereas the treatment here laid down is both *safe* and *effectual*. Vide Part IV. The Section on CATARRH.

SECT.

SECT. XXXIX.

OF DARKNESS.

As a due degree of stimuli is necessary to the maintenance of firm health, we now see the reason why confinement in dungeons, independent of dampness, is so injurious to the health of prisoners: and why the meaner sort of houses in this country, since they have been *darkened** in consequence of the heavy window tax, have been observed to exhibit a race of more pale and sickly inhabitants. Finally, why the *gloomy chambers* of the sick, labouring under asthenic diseases, are rendered more unwholesome, and acquire additional horrors, by indiscriminately shutting out the cheerful beams of day: and why the effects of all diseases of this class are in-

* The fact was repeatedly noticed in his different journeys by the philanthropic Mr. HOWARD; and it is notorious to every eye, that the servants who are stewed in dark chambers deprived of *fresh air* and the *morning light*, exhibit the most sickly appearance. It requires another HOWARD to point out the *evils* inflicted by the *governors* on the *governed*, and to stir up HUMANITY in the cause of *suffering Nature*; and, since even a *bad government* is, comparatively speaking, a *blessing*, to occasion it to be *so administered* as to make it the FIRST OF BLESSINGS.

created

creased by thus imprudently depriving the patient of one of the most exhilarating cordials in nature.

“That the *absence* of LIGHT accumulates IRRITABILITY in the fibre,” is shewn from the following experiment.

I enveloped, says GIRTANNER, the leaves of the *mimosa*, or sensitive plant, in an opaque body, so that the air might have free access, while the light could not penetrate, and I found that all these leaves became *considerably more irritable* than the rest.

Animals deprived of LIGHT, or living in DARK PLACES, lose their colour and become *white*, as is observable in *arctic animals* during the long nights in the countries near the pole: I have observed it also in the animals that inhabit the *Alps*, and which conceal themselves the greatest part of the year in subterraneous dwellings. Mice kept in a cage in a very dark room produce *white mice*.

If we consider the complexion of different countries, we shall find them dark in proportion to the nature of the climate. In general it may be asserted, that, as we approach the line, we find the inhabitants of each country grow browner until the colour deepens into perfect blackness.

blackness. All EUROPE, almost the whole of ASIA, and the temperate parts of AFRICA, are occupied by men of a fair complexion. All the torrid zone in AFRICA, some of the warmer regions adjacent to it, and a few countries in ASIA, are filled with people of a deep black colour. If we trace the nations of our continent, making our progress from cold and temperate countries towards those parts which are exposed to the influence of vehement and unremitting heats, we shall find the extreme whiteness of their skin soon diminish, and its colour deepen gradually as we advance; and, after passing through all the successive gradations of shade, terminate in an uniform unvarying black. Thus, taking our standard from our own country, we find the FRENCH, who are more southern, a slight shade deeper than *we*; going further down, the SPANIARDS are browner than the *French*; the inhabitants of Fez darker than *they*; and the natives of NEGROLAND the darkest of all. The irritable principle in the fibre is also found to correspond with *these shades*.

In all regions the *children* are born *fair*, or at least *red*, and grow darker or black as they advance in life. The *soft flaxen hair* inclining to *red*, and the *blue eye*,

denotes

denotes an IRRITABILITY of *temperament*, whereas the *curled, black and strong hair*, with a *black eye*, shews a stronger fibre, with LESS IRRITABILITY.

Blanched plants lose their green colour and become white, and are not then capable of supporting a great quantity of LIGHT. In the *white Negro*, born of black parents, exhibited in LONDON, the hair was of a *silver white*; the eye had a ferrety appearance, and was so impatient of the stimulus of LIGHT, that it was almost in constant action. These accidental varieties in the human species are properly called MOON-EYED, for they cannot endure the glare of light from the sun, and though they enjoy his reflected rays from the moon, they are not able to behold that luminary. The nose in this *white negro* was flat, exactly resembling that of a black, and the lips were thick, and the skull prominent from behind. No doubt, therefore, remained of this woman having been born of negro parents*; and the person who shewed

* She was at this time giving suck to an infant whose father was a white, but the child had all the appearance of a *mulatto*.

There is now at EXETER CHANGE a man, born of black parents, who is black and white, directly *pie-balled*.

1st. *Query*. Would the TRADERS IN HUMAN FLESH feel some conscience in selling this *white negro* woman?

2d. *Query*. On which side would the balance of opinion preponderate with them with regard to the *pie-balled* man?

it had attestations to convince the most incredulous. This variety of the human species has been particularly observed in three different districts of America. Their skin is covered with a fine hairy down of a *chalky white*, the hair of their heads, their eye-brows, and eyelashes, are of the same hue. They are universally described by all travellers as a race of *low STATURE*, of a *feeble MAKE*, and *incapable of enduring the slightest FATIGUE**.

It is melancholy to observe the pains some white men have been at to represent the *black race* as a lower species of animal, to confound them with the monkey; or if men, to degrade them into beings destined by a benevolent and superintending PROVIDENCE to become the *slaves* of such as boast the names of *Christian and European*!

If they are uncivilized, it is you who have plunged them deeper in their darkness. If their country is unfruitful, it was once the chief resource of Rome. If barbarous in the extreme, you have set them a still more barbarous example. And if it shall be said, that the 18th century was an enlightened period, your deeds will be adduced to disprove the assertion. Vide Part I. page 54; also note †, page 56.

* See ROBERTSON'S History of America.

SECT. XL.

OF SLEEP.

THOUGH man in his sleeping state is a much less perfect animal than in his waking hours, and though he consumes more than one third of his life in this his irrational situation, yet is the wisdom of the AUTHOR of NATURE manifest even in this seeming imperfection of his work.

According to Dr. JOHN BROWN,

- I. *Life is a forced state.*
- II. *To every animated being is allotted a certain portion of the IRRITABLE PRINCIPLE *.*
- III. *Every power that acts on the living frame is STIMULANT, or produces excitement by expending IRRITABILITY.*

* Dr. BROWN supposed every living system to have received at the beginning its determinate portion of IRRITABILITY, and therefore, although he spoke of the *exhaustion*, *augmentation*, and even *renewal*, of IRRITABILITY, it was not his intention to induce his pupils to think of it, as a kind of FLUID SUBSTANCE generated in the animal body. According to him IRRITABILITY was an unknown *something*, subject to *peculiar laws*, and whose *different states* we were obliged to describe by terms borrowed from the qualities of material substances. See Part I. page 33; also the Life of Dr. BROWN by Dr. BADDOCK, prefixed to a new edition of his works.

IV. The EXCITING POWERS may be referred to 2 *classes*.

1. *Mechanical*, as heat, food, blood, &c.
2. *Mental*, as thought, and the emotions of the mind, &c*.

V. The application of *stimuli* † after a certain time *exhausts* the IRRITABILITY, or EXCITABILITY, of the system.

To recruit *which loss*, the all-wise and merciful CREATOR has instituted the season of SLEEP, at which time the sti-

* As Dr. BROWN has defined *life* to be a *forced state*, it is fitly represented by a *flame*, forcibly drawn forth, from *fuel* little disposed to combustion, by the constant application of streams of *air* poured into it from the different tubes of a machine.

1. If some of the tubes are supposed to convey *oxygen*, or *pure*, *air*, they will denote the highest class of exciting powers, *opium*, *must*, *spirits*, *camphor*, *wine*, &c. the DIFFUSIBLE STIMULI of Dr. BROWN, which bring forth for a time a greater quantity of life than usual, as the blowing in of *pure air* into a fire will temporarily draw forth an uncommon quantity of flame.

2. If other tubes be supposed to convey *common*, or *atmospheric*, *air*, they will represent the ordinary EXCITING POWERS, or stimuli, applied to the human frame, such as *heat*, *light*, *air*, *food*, *drink*, &c.

3. While such as convey *impure* or *bad air* may be used to denote what have formerly been termed SEDATIVE POWERS, such as *bad diet*, *contagious miasmata*, *foul air*, &c.

† The reader will now probably be at no loss to understand the seeming paradox of the *Brunonian system*; that food, drink, and all the powers applied to the body, though they *support life*, yet *consume it*; for he will see, that the application of these powers, though they *bring forth life*, it wastes the EXCITABILITY, or MATTER OF LIFE, just as the air blown into the fire brings forth more flame, but wastes THE FUEL, or MATTER OF FIRE. This is conformable to the common saying, the more a spark is blown, the brighter it burns and the sooner it is spent.

multi of external objects are excluded by the *silence* and the *darkness* of the night; and as *cold* * accumulates the irritability of the fibre, it is wisely fore-ordained that this season shall be accompanied with a suitable degree of *cold*. Common or ordinary sleep, produced by the application and action of stimuli, from what has been said, seems therefore to be a state, the result of a law of the animal oeconomy, which takes place in order to remove the effects of stimuli, and to *reflore*, as much as possible, the *excitability* of the system; as during this state the stimulus of volition is suspended, all external objects cease to make impression, even cathartics lose their powers of action, while the *atmospheric air* is almost the only external power, which then continues to be applied, at once carrying off what is excrementitious from the lungs, as it affords probably to the system that *principle* which is expended by the various actions of life.

Besides the very great quantity of the **IRRITABLE PRINCIPLE** perpetually *expended* in moving the arterial, venous, and absorbent systems, and the other organs of the body, as described page 351, there is also, during our waking hours, a *constant expenditure* of it by the action

* Hence the evil of *feather-beds*; for we should court no more than a *suitable degree of warmth*.

of our locomotive muscles and organs of sense. Thus the optic nerves, where they enter the eye, and the great expansion of the nerves of touch beneath the whole of the cuticle, evince the *great consumption* of the **IRRITABLE PRINCIPLE** by these senses. And our perpetual muscular action in the common offices of life, and in constantly preserving the perpendicularity* of our bodies during

* When any person loses the power of muscular action, whether he is erect or in a sitting posture, he sinks down upon the ground; as is seen in fainting fits, and other instances of great debility. Hence it follows, that *some exertion* of muscular power is necessary to preserve our *perpendicular attitude*. This is performed by proportionally exerting the antagonist muscles of the trunk, neck, and limbs; and if at any time in our locomotions we find ourselves inclining to one side, we either restore our *equilibrium* by the efforts of the muscles on the other side, or by moving one of our feet extend the base which we rest upon to the new center of gravity. But the most easy and habitual manner of determining our want of perpendicularity, is by attending to the *apparent motion* of the objects within the sphere of distinct vision. Hence no one who is hood-winked can walk in a straight line for a hundred steps together; for he inclines so greatly, before he is warned of his want of perpendicularity, not having the apparent motions of ambient objects to measure this inclination by, that he is necessitated to move one of his feet outwards, to the right or to the left, to support the new centre of gravity, and thus errs from the line he endeavours to proceed in. Thus any one who stands alone on the top of a high tower, if he has not been accustomed to balance himself by objects placed at such distances and with such inclinations, begins to, and endeavours to recover himself. During this time the apparent motion of objects at a distance below him is very great, and the impressions of these apparent motions continue a little time after he has experienced them; and he is persuaded to incline the contrary way to counteract their effects; and either immediately falls, or applying his hands to the building, uses them to preserve his

during the day, evince a considerable *expenditure* of the IRRITABLE PRINCIPLE by our locomotive muscles. It follows, therefore, that if the exertion of these organs of sense and muscles be for a while *intermitted*, that a *large quantity* of the IRRITABLE PRINCIPLE must be *accumulated*.

As soon as a person begins to sleep, as (in *hemiplegia*, where the *limbs* on *one side* have lost their power of voluntary motion, and the patient is for many days employed in moving those of the *other*, or as when in the *cold fit* of an intermittent fever some parts of the system have for a time continued *torpid*, and have thus expended less than their usual expenditure of the IRRITABLE PRINCIPLE), a *hot fit* succeeds; so, owing to the *suspension* of the voluntary actions, the peristaltic motion of the

his perpendicular attitude, contrary to the erroneous persuasions of his eyes. Thus on horseback we accurately observe another person, whom we meet trotting towards us, without confounding his jumping and progressive motion with our own, because we have been accustomed to them both; that is, to undergo the one, and to see the other at the same time. But in riding over a broad and fluctuating stream, though we are well experienced in the motions of our horse, we are liable to become dizzy from our inexperience in that of the water. And when we first go on ship-board, where the movements of ourselves, and the movements of the large waves are both new to us, the *vertigo* is almost unavoidable with the terrible sickness which attends it, and after we come from on ship-board, being used to reel about to maintain our perpendicularity, we have at first the same drunken gait as we had on ship-board.—Dr. DARWIN.

intestines,

intestines, and the exclusion of the strong stimulus of mental exertion, an *accumulation* of the IRRITABLE PRINCIPLE takes place during sleep, and the blood-vessels and absorbents have in consequence an increased action, and hence the nutriment is with great energy forced over every part of the system to repair the wastes of the preceding day: for it is probable that *nutrition* is almost entirely performed in SLEEP; and that young animals grow more at this time than in their waking hours, as young plants have long since been observed to grow more in the night, which is generally their time of sleep. Hence also the *heat* of the system is gradually increased, and the extremities of feeble people, which had been cold during the day, become warm, while in others sweats are so liable to break out towards morning*.

* Dr. DARWIN.

SECT.

SECT. XLI.

SOME PRACTICAL OBSERVATIONS.

FROM the foregoing Section we learnt, that *night* is the time adapted for *sleep*; and from the Section on *Habit**, the propriety of going to bed and rising at a certain hour.

We have seen how this state is produced by the proper application of stimulant powers during the day, and since it is to accumulate irritability in the system, the chambers in which we sleep ought therefore to be *silent*, *dark*, and *moderately cold*, and since the chief refreshment of sleep arises from the *oxygen*, or *vital*, air, imbibed by the system, forming a part of the *digestive process* then going on, we should be *cautious* how we are surrounded by *curtains*,

In the state of nature, when the sense of hunger is appeased by the stimulus of agreeable food, and the business of the day is over, the human savage, at peace with the world, then exerts little attention to external objects;

* Vide page 500.

pleasing reveries of his successes in hunting succeed, and at length sleep is the result: till the system is recruited, and he awakes with fresh vigour.

In like manner the poor sleep little; forced, by their situation, to lengthen out their labour to their necessities, they however go to bed early in the evening, the irritable principle being exhausted by the labours of the preceding day, and they get up refreshed at sun-rise, and accumulate again fresh irritability by the coolness of the morning*. The blooming complexion of our peasantry, the permanence of their good looks, and their strength and activity, compared with the sickly visage and ailing constitutions of the Sons of Luxury, who turn night into day, and sleep in beds of down, clearly demonstrate which mode of life is most conducive to health.

It is justly said by Dr. MACKENZIE, that he who sleeps long in the morning, and sits up late at night, hurts his constitution without *gaining time*; and he who will do it merely in compliance with the fashion, ought not to repine at a *fashionable state of bad health*.

* Even Dr. COLLEN, in his last work, expresses himself with a precision that is not frequently found in his theoretical writings. *A State of sleep*, says he, *subsisting for some time, induces a state of the system more ready to be affected by stimuli of all kinds.* *Materia Medica*, II. 223.

Sleep, tired Nature's sweet restorer, cannot be safely dispensed with. *Study*, protracted far into the hours of night, *cares harboured*, and even very late hours in company, by encroaching on the hours adapted for sleep, are sure to lay the foundation of many dreadful diseases.

If *sleep* does not pay the accustomed visit, the whole frame of man will in a short time be thrown into disorder; his appetite ceases; his spirits are dejected; and his mind, abridged of its slumbering visions, begins to adopt waking dreams. A thousand strange phantoms arise, which come and go without his will: these, which are transient in the beginning, at last take firm possession of the mind, which yields to their dominion, and, after a long struggle, runs into confirmed madness or death. But it is happy for mankind, that this state of inquietude is seldom driven to an extreme. However man finds it more difficult to procure sleep than any other animal, and some are obliged to court its approaches for several hours together, before they incline to rest. It is in vain that all light is excluded; that all sounds are removed; that books of entertainment are read; the *restless* and *busy mind* still retains its former activity; and reason that wishes to lay down the reins,

in spite of herself, is obliged to maintain them. This is strongly instanced by Shakespeare in the soliloquy of King HENRY.

How many thousand of my poorest subjects

are at this hour asleep!—O gentle sleep,

nature's soft nurse, how have I frighted thee,

that thou no more wilt weigh my eye-lids down,

and steep my senses in forgetfulness?

Why, rather, sleep, ly'st thou in smoky cribs,

upon uneasy pallets stretching thee,

and hush'd with buzzing night-flies to thy slumber,

than in the perfum'd chambers of the great,

under the canopies of costly state,

and hush'd with sounds of sweetest melody?

O thou dull god, why ly'st thou with the vile,

in loathsome beds; and leav'st the kingly couch?—

A watch-case to a common turn bell!

Wilt thou upon the high and giddy mast
seal up the ship-boy's eyes, and rock his brains

in cradle of the rude imperious surge;

and in the visitation of the winds,

who take the ruffian billows by the top,

curling their monstrous heads, and hanging them

with deaf'ning clamours in the slippery shrouds,

that with a horly, death itself awakes?

Can'st thou, O partial sleep! give thy repose

to the wet sea-boy in an hour so rude;

and, in the calmest and stillest night,

with all appliances and means to boot,

deny it to a King.—Then happy are the low, they lie down,

and easy is the head that wears a crown.

It

It is even thought unnatural for a *King* to enjoy a whole night's rest.

Now pleasing sleep had seal'd each mortal eye,
stretch'd in the tents the Grecian leaders lie,
th' Immortals slumber'd on their thrones above;
all, but the ever-watchful eyes of Jove.

To honour *TUSTIA*'s son, he bends his care,
and plunge the *Greeks* in all the woes of war:
Then bids an empty phantom rise to fight,
and thus commands the vision of the night.

Fly hence, deluding dream! and light as air,
to *AOAMENNON*'s ample tent repair.
Bid him in arms draw forth th' embattel'd train,
lead all his *Grecians* to the dusty plain.

Swift as the word the vain illusion fled,
descends, and hovers o'er *ATRIDES*' head;
cloth'd in the figure of the *Pylian* sage,
renown'd for wisdom, and rever'd for age;
around his temples spreads his golden wing,
and thus the flatt'ring dream deceives the King.

Canst thou, with all a monarch's cares oppress,
Oh *ATREUS*' son! canst thou indulge thy rest?
ill fits a chief who mighty nations guides,
directs in council, and in war presides,
to whom its safety a whole people owes,
to waste long nights in indolent repose.
Monarch, awake! 'tis *Jove*'s command I bear,
thou, and thy glory, claim his heav'nly care.
In just array draw forth th' embattel'd train,
lead all thy *Grecians* to the dusty plain;
&c.

The phantom said; then vanish'd from his sight,
resolves to air, and mixes with the night.

In the case of Lord LYTTLETON*, the want of sleep is attributed as the cause of his death. *Intense thought* puts the brain into a state more or less unapt for rest, and a multitude of facts, in the ingenious tract of TISSOT on the Diseases of *Literary Characters*, prove, that the aptitude of the brain, to restore by sleep, the impaired energies of the corporeal functions, may be lost altogether. Much it imports, therefore, the *studious*, to limit their learned labours to proper hours, to support strength by intervals of exercise in the open air, and to *all others* to solicit sleep by a seasonable dismissal of business and of care.

* Dr. JOHNSON says of this nobleman, that he was "Inter doctos nobilissimus: inter nobiles doctissimus, inter utroque optimus: ut enim antiquam generis claritatem eruditione.—Eruditionem, miro vitæ candore decoravit; sic his omnibus, omnium pulcherrimam apicem, et colophorem addidit, admirabilem animi modestiam!" *Vide Disquisitions relative to the Nervous System*, p. 224.

SECT. XLII.

OF IMPURE AIR.

As the *immediate cause* of sleep consists in the *suspension of volition*, it follows, that whatever *diminishes* the general quantity of the *irritable principle*, or *diverts* it from the faculty of *volition*, will constitute a *remote cause* of *sleep*;—such as fatigue from muscular or mental exertion, which diminishes the general quantity of the *irritable principle*,—or by increasing of the action of the vascular and absorbent systems, as are the effects of opium, wine, food, &c. which not only by their expenditure of the *irritable principle* diminish the quantity of volition, but also by their producing pleasurable sensations * (which occasion other muscular and sensual motions in consequence) doubly decrease the voluntary power, and thus more forcibly produce sleep:—or lastly, an increase of the sensitive motions, as by attend-

* Vide page 212.

ing to soft music *, which diverts the *irritable principle* from the faculty of volition.

Another method of inducing sleep, says the illustrious Dr. DARWIN, is delivered in a very ingenious work lately published by Dr. BEDDOES, who, after lamenting that *opium* frequently occasions restlessness, thinks, "that in most cases it would be better to induce sleep by the *abstraction of stimuli*, than by *exhausting the excitability*," and adds, "upon this principle we could not have a better soporific than an atmosphere with a diminished proportion of oxygen, or vital air, and that common air might be admitted after the patient was asleep."

In a subsequent work, this ingenious physician says, I had formerly been led to infer, "that an atmosphere, with a diminished proportion of oxygen, would be in some cases a better soporific than any we at present possess, and "I have since † received confirmation of this opinion."

A person

* BOERHAAVE, on some occasions, in order to procure sleep for his patient, directed water to be placed in such a situation so as continually to drop on a brass pan.

Fontesque lymphis obstrepuunt manantibus,
somnos quod invitet levis. — HOR.

† Vide Considerations on the Medicinal Use of FACTITIOUS AIRS, to which are added communications from Doctors DARWIN of Derby, WITHER-

A person in a consumption, who for months had taken opium at night, slept perfectly well *without opium* when he came to respire HYDROGEN GAS*: his sleep he remarked to be more profound than usual. The air of his room being loosely mixed with HYDROGEN GAS, his servant, a *very bad sleeper*, declared *that he did not know what was come to him, he slept so sound*. This man necessarily inspired much HYDROGEN GAS from attend-

ing of Birmingham, PERCIVAL of Manchester, EWART of Bath, THORNTON of London, JOHNSON of Worcester, GARNET of Harrogate, PEARSON of Birmingham, FERRIS of Manchester, TROTTER from on board Lord Howe's fleet, to which he is physician, CARMICHAEL of Birmingham, BRIGGS of the Island Santa Cruz, GIMBERNAT surgeon to the king of Spain, the Rev. Mr. TOWNSEND rector of Pewsey, the Rev. Mr. ATWOOD rector of Saxlingham and Sharrington, Messrs. HILL, PARR, CAPPER, SANDFORD, CHISHOLM, and others.

This long enumeration of names is given here to shew that the design of making the NEW CHEMISTRY subservient to mankind is not an *idle and ridiculous speculation*, otherwise would such a number, and of such men, for the most part unconnected but from literary intercourse, combine in recommending and trying the new remedies which it has suggested?

Dr. CRAWFORD, physician to St. Thomas's hospital, the celebrated author of a work on *Animal Heat* (vide page 81), is a new accession of force. Having a pulmonary complaint, he placed himself under the care of Dr. THORNTON, and declared to him, that the *hydro-carbonic air*, which he inhaled diluted with atmospheric, produced a *soothing tranquillity*, such as opium is known sometimes to produce, and he is certain, that the *correction* of the offensiveness of his expectoration is wholly to be attributed to this new remedy. Vide the Letters from Dr. THORNTON to Dr. BEDDOES, in his Appendix to *Considerations on the Use of Medicinal Airs*. Second edition.

* *Inflammable air.*

ance on his master. In two consumptive patients, I am able to induce sleep *almost at pleasure* by the HYDRO-CARBONIC AIR*. In a great majority of such cases, it is well known that the nights are exceedingly disturbed in spite of *opium* freely administered. The soporific virtue of HYDRO-CARBONATE seems however, from the experience I have had, by no means confined to consumption.

The analogy which obtains between *sleep* and the state of *torpor*, is so striking, and at the same time so applicable to the present subject, that it seems to deserve more attention than has yet been bestowed upon it.

The class of *dormant animals*, says the celebrated natural historian, M. de BUFFON, are not, as vulgarly imagined, in a state of absolute *sleep*, for the respiration is scarce perceptible, and the blood is cold, or scarcely exceeds the temperature of the outward air. There is little reason then to wonder why these animals, so inferior comparatively to others in point of heat, should become torpid, as soon as their own small portion of internal heat ceases to be assisted by the external warmth of the air: a circumstance which naturally happens when

* A mixture of *fixed and inflammable airs*.

the thermometer is not more than 10 or 11 degrees above congelation. The same extends to all torpid animals during the winter. Alike are its effects on the dormouse, the hedge-hog, and the bat. Of this class the *marmot* is the most remarkable, which delights in the regions of ice and snow, and is never found but on the highest mountains: it, nevertheless, of all others is the most liable to be rendered torpid by cold.

This animal, though extremely active in summer, lays up no provision for the winter, because such a precaution would be useless* during its dormant state. But when he perceives the first approaches of the season, in which his vital motions are to continue in a great measure suspended, HE CLOSES UP THE APERTURES OF HIS SUBTERRANEAN DWELLING WITH SUCH SOLIDITY, THAT IT IS MORE EASY TO OPEN THE EARTH ANY WHERE ELSE, THAN WHERE HE HAS CLOSED IT. When their retreat is discovered, they are found, each rolled into a ball, and apparently lifeless. In this state, they may be dragged roughly along the ground, or even killed, without testifying any sense of pain.

* The *bees*, which were transported to BARBADOES, and other western islands, ceased to lay up honey *after* the first year, and are become very troublesome; but those in JAMAICA continue to make honey, as the cold north winds, or rainy seasons of that island, confine them at home for several weeks together.—Dr. DARWIN.

By a *mild and gradual heat alone*, are they to be recovered from this torpor, and if brought suddenly before a *fire*, they *perish*. A few degrees above the tenth or eleventh degree are sufficient to re-animate them; and if they are kept in a *warm* place during the winter, they do not become torpid, but continue as lively as at any other time. If the marmot remains longer torpid than the dormouse, it is probably because the weather of the climate is longer cold.

It is curious, adds M. de BUFFON, to observe this animal, when he is prematurely forced to pass from the torpid to an active state. He first yawns, fetches a deep sigh, and utters broken inarticulate sounds like a drunken man. His limbs become less rigid, he stretches out his legs, fetches another still deeper sigh, opens his eyes, and at length recovers. Such are the uneasy sensations he visibly undergoes, from a sudden and forced re-animation; which is probably performed in a more gentle and imperceptible way by the vernal warmth, when left in his cell. — *But what is singular*, HE NEVER BECOMES TORPID, THOUGH EXPOSED TO A DEGREE OF COLD EQUAL TO THAT OF FREEZING, PROVIDED HE IS KEPT IN THE *open air* INSTEAD OF A CLOSE PLACE.

From

From the circumstance of these animals excluding all communication with the external atmosphere, may not the *stagnant air* of the cell, contaminated by their respiration, and saturated with *carbonic gas*, add considerably to the *sedative effects* of cold in bringing on torpor *?

It is curious to observe how the *animal* and *vegetable* tribes mutually support each other, through their whole existence! Vegetables, by emitting *vital air* during the day, purify the atmosphere for the use of animals; while the *fixed air* expired by animals affords nourishment to vegetables. But at the time when this diffusive stimulus is less wanted, sleep being desirable, the vegetable race then pours forth *azotic air* †.

* From the account of Mr. Wildman, and other people of nice observation, it appears, that during the very severe part of the winter season *bees* are *torpid*, and do not consume any of their provision. As the death of our hives of bees arise frequently from the cold not being sufficiently great to render them torpid, at which time they require the provision that has been taken from them, I directed, says Dr. DARWIN, two hives to be placed in a *confined cellar*, and observed, during all that time, they did not consume any of their stock of provision, for their weight did not decrease, as it had done when they were kept in the *open air*. Might not a direct experiment with *falsitious air* turn out, with regard to *bees*, of *twofold advantage*?

† Vide Part I. p. 29.

With

With what **ADMIRABLE OECONOMY** has the **SU-
PREME ARCHITECT** then established this *reci-
procal intercourse* between the *animal* and *vegetable king-
doms*! By what **ELEGANT SIMPLICITY OF DESIGN**
are the different parts of nature thus rendered at
once subservient to the mutual support of each other
respectively, and to the general well-being and harmony
of the whole *!

* From Dr. FOTHERGILL's Essay on the Suspension of Vital Action,
whose able deductions, strong reasoning, and ingenious queries, we shall have
frequent occasion to notice.

SECT.

SECT. XLIII.

OF REST.

Sleep and wakefulness bear a great resemblance to *exertion and rest*; as *wakefulness* is the natural state of *action*, in which the animal machine is fatigued and wasted, and *sleep* the state of *ease*, in which it is refreshed and repaired. Thus we may look upon the time of being *awake* and *active* as the time of wearing out the animal frame; and the time of *sleep* and *rest*, as that in which it is repaired and recruited; for, in action, the *irritable principle* is continually taken from the muscular fibres, which cannot otherwise be replaced than by *rest*.

1. Of Voluntary Action.

Not only the *will*, by which the electric fluid is sent into the muscles, but the *muscles* themselves seem, as it were, to get fatigued by exertion, and require a certain time to recruit their powers: for in every contraction of a fibre, there is an expenditure of the *irritable principle*; and where the exertion of the voluntary powers

has been for some time increased, and the muscles or organs of motion have in consequence acted with greater energy, their propensity to activity is proportionally lessened; which can be ascribed to nothing else but the *exhaustion* or *diminution* of the IRRITABLE PRINCIPLE. Indeed every one must have experienced the refreshment arising from *repose*, and it is an established fact, that for a horse to perform a long journey, he should be previously kept at rest for several days in the stable. Upon waking after profound sleep we stretch our limbs, which arises from the *accumulation* of the *irritable principle* in the fibres. From the same cause, when the muscles of our face have been long in a state of inaction, we yawn: and children and young animals, who have abundant irritability, are impatient of confinement, and seem never easy but in a change of position.

2. Of Involuntary Action.

After animal fibres have for some time been exerted into contraction, a *relaxation* succeeds, even though the exciting cause continues to act. In respect to the *irritative motions* this is exemplified in the peristaltic contractions of the bowels, and the beatings of the heart; which

which cease and are renewed alternately, though the stimulus of the aliment and blood continue to be uniformly applied: in *sensitive motions*, as in fits of the stone and gravel, and in parturition, though the stimulus is perpetual. In our *muscular exertions* it is experienced, as no one can hang long by the hands, however vehemently he wills so to do; and the changes of our attitude evinces the necessity of relaxation to those muscles which have been long in action *.

The application of a stimulus, whether that stimulus be material or mental, excites the correspondent irritable and sentient principles into action, and this causes the contraction of the fibre and the sensation of the nerve. On the contraction of the fibre a part of the *irritable principle* † becomes expended, and the fibre, as was said before, ceases to contract, though the stimulus

* Vide page 459.

† The two principles, viz. the *irritable* and *sentient principles*, are here mentioned as distinct. Dr. DARWIN confounds them under one and the same title, and calls them by the very expressive term, *SENSORIAL POWER*. Whether this be the *irritable principle* itself (whatever this principle may be), or *oxygen*, or *electricity*, upon which its powers depend, the reasoning is equally true: for as a philosopher (Dr. FOTHERGILL) well expresses it,

CAUSA LATET—VIS EST NOTISSIMA.

The cause may lie concealed; but its power is most evident.

continues to be applied; till in a certain time the fibre, having received a supply of the *irritable principle*, is ready to contract upon the application of a stimulus. If the stimulus on the contrary be withdrawn, the same quantity of *irritable principle* soon becomes resident in the fibre as before its contraction; as appears from the readiness for action of the large locomotive muscles of the body in a short time after common exertion, and in those muscular fibres which are subject to constant stimulus, as the arteries, glands, and capillary vessels; and on this account those muscular fibres become afterwards excitable into their *natural actions* by a much *weaker stimulus*; or into *unnatural violence* of action by their *accustomed stimulus*, as is seen in the hot fits of intermittent fevers, which are in consequence of the previous cold ones. Thus as the minute vessels of the skin are constantly stimulated by the fluid matter of heat; if the quantity of this stimulus of heat be a while diminished, as in covering the hands with snow, the vessels cease to act, as appears from the paleness of the skin; if this cold application of snow be continued but a short time, the *irritable principle*, which had habitually been supplied to the fibres, becomes now *accumulated* in them,

them, owing to the want of its being expended by their accustomed contractions; and thence a less stimulus of heat will now excite them into violent contractions. Thus on a frosty day with a bleak wind, the face of a person exposed to the wind is at first pale and shrunk; but on turning the face from the wind, it becomes soon of a glow, with warmth and flushing. The glow of the skin in emerging from the bath is owing to the same cause; for by lessening the quantity of heat for a minute or two by going into the cold bath, a great *accumulation* of the *irritable principle* is necessarily produced. On emerging from the bath the irritable fibre is therefore thrown into greater exertion by the stimulus of the common degree of the warmth of the atmosphere, and a great increase of *animal heat* ensues*.

This experiment of cold bathing presents us with a simple FEVER-FIT; for the pulse is weak, small, and quick, during the cold immersion; and becomes strong, full, and quick, during the subsequent glow of heat; till at length all these unnatural exertions spontaneously subside with the increased irritability that pro-

* This has been more fully explained when on the subject on the manner of catching cold, page 432.

duced them; just as the eye, on coming from darkness into day-light, in a little time ceases to be dazzled and pained, and gradually recovers its natural and sufficient supply of the *irritable principle*.

We will consider the symptoms in consequence of the *quiescence* which begins the fits of fever.—From the *quiescence* of the intestinal canal a loss of appetite and flatulencies proceed. From the partial *quiescence* of the glandular viscera a swelling and tension, not unfrequently about the præcordia, becomes sensible to the touch; which is occasioned by the delay of the fluids from the defect of venous or lymphatic absorption. The pain of the forehead, and of the limbs, and of the small of the back, arises from the *quiescence* of the membranous fascia, or muscles of those parts, in the same manner as the skin becomes painful when the vessels, of which it is composed, become *quiescent* from cold. The trembling is in consequence of the pain of coldness; the yawning, shuddering, and rigors, are exertions for the removal of pain and accumulated irritability. Sickness and vomiting is a frequent symptom in the beginning of fever-fits, for the muscular fibres of the stomach share the general torpor; its motion becomes first less-

ed, and then retrograde *. The small pulse, which is slow at the commencement, and which is frequently trembling and intermittent, is owing to the *quiescence* of the heart and arterial system, and to the resistance opposed to the circulating fluid from the inactivity of all the glands and capillaries. The great weakness and inability to voluntary motions, with the insensibility of the extremities, are owing to the *general quiescence* of the whole moving system. If all these symptoms are further increased, the *quiescence* of all the muscles, including the heart and arteries, becomes complete, and death ensues. This is, most probably, the case of those who are starved to death with cold, and of those who are said to die in Holland from long skating on their frozen canals.

This *accumulation*, therefore, of the *irritable principle*, if it happens to the vessels of the skin from want of heat, occasions the pain of cold; and if to the arterial system,

* Such is the construction of animal bodies, that all their parts, when subjected to less stimuli than nature designed, perform their natural functions badly. Thus, with respect to the stomach, uneasiness is first produced, then sickness, and at length efforts to vomit. In hysteria, and other complaints, this inclination may be removed by opium or wine; but here perhaps the defect is not so much in the nature of the stimuli in contact with the fibre, as to the *temporary deficiency* of the IRRITABLE PRINCIPLE, or, as was formerly said, of *VIS VITÆ* (*powers of life*).

from

from the want of its adapted stimuli, many disagreeable sensations are occasioned, such as are experienced in the cold fits of intermittent fevers, and are as various as there are glands or membranes in the system, and are generally termed universal uneasiness. — But as soon as this *general quiescence* of the system ceases; from the *accumulation* of *sensorial power*, which is the natural consequence of *previous quiescence*, the *HOT-FIT* commences. The heart is now roused to inordinate action, the skin becomes red, and the body is suffused with heat. Every gland, as its powers of action are increased by the *accumulation* of the *irritable principle* during its late quiescence, is now stimulated into stronger action than is natural, and hence a superabundance of all the secretions is produced. The urine during the *cold fit* is in small quantity and pale, both from a deficiency of the secretion, and a deficiency of the absorption. During the *hot fit* it is in its usual quantity, but very high coloured and turbid, because a greater quantity had been secreted by the increased action of the kidneys, and also a greater quantity of its more aqueous parts had been absorbed from it in the bladder by the increased action of the absorbents. This violent exertion not only diminishes
the

the *accumulated irritability* in the system, but at the same time induces, first, pleasure, and soon after pain; which, whether it be succeeded by inflammation of the brain, lungs, or pleura, or not, becomes an additional stimulus; and acting along with the former ones, produces still greater exertions, until this storm of nature sinks into a silent calm, or, to use another metaphor, leaves the patient below par. Now, when the *irritable principle* is thus *exhausted* by *useless exertions* (for here this accommodating temper of nature is an evil *, if such an expression may be used), the different organs of the body become as it were torpid, and a *second fit* of *quiescence* succeeds that of *abundant activity* †. During this second fit of quiescence the *irritable principle* becomes again *accumulated*, and another fit of exertion follows in train. These vicissitudes of exertion and inaction

* See a vindication of the wisdom and goodness of God in the *establishment* of GENERAL LAWS, Section the last.

† Sometimes, however, the fibre seems as it were overpowered by its state of *quiescence*, and the IRRITABLE PRINCIPLE does not again *accumulate* in the fibre, as was explained when relating the effects of the cold bath, page 417, and as will be fully explained when we come to treat of HYDROTHORAX (water in the chest), succeeding to *inflammation of the lungs*, ANASARCA (general dropsy), from the *abuse of spirituous liquors*, and TYPHUS (putrid fever) commencing with *synocha* (violent inflammatory fever).

constitute

constitute the paroxysms of remittent fevers, or intermittent ones, when there is an interval of nearly the natural action of the arteries between the exacerbations, and it will be shewn in Part IV. * that upon this principle chiefly the cure of such fevers depends.

* Vide the Sections on FEVERS,

SECT. XLIV.

OF HUNGER.

THERE are *three classes* of readers.

1. The *first class* are those who wish to find in a work the union of the *agreeable* with the *useful*. For this class of readers the present work is attempted to be formed.

2. The *second class* are those who seek only for what is *profitable*. This class may select from the table of contents such information *only* as they wish.

3. The *third and more numerous class* of readers are those who devour in a few hours a whole work, and digest no part of it; who read merely for the sake of saying they are not *ignorant* of the contents of any popular work. This class of readers will find their account answered by reading the abridged view of this book in the table of contents, which, to tell the truth, was not designed for them, but to refresh the memory of the first class of readers.

As the narrative of the voyage of Captain BLIGH to the south seas, for the purpose of conveying the BREAD-

TREE to the *West Indies*, and his *sufferings* and *preservation*, are very interesting, and appertain to the subject of this section, it is presumed, that a detail of them will not be found unacceptable to that class of readers for whom this work is compiled. They are therefore recorded at greater length than the two latter classes will approve of; but to these *our apology* is presented in our analytical table of contents.

CAPTAIN BLIGH'S NARRATIVE.

THE king having been graciously pleased to comply with a request from the merchants and planters interested in his Majesty's *West-India* possessions, that the BREAD-FRUIT TREE * might be introduced into those

* In the *Society Islands* the BREAD-FRUIT grows on a tree that is the size of a middling oak; its leaves are frequently about a foot and a half long, of an oblong shape, deeply sinuated like those of the fig tree, which they resemble in colour, and in the exuding of a white milky juice upon being broken. The fruit is about the size and shape of a child's head. The eatable part lies between the skin and the core; it is as white as snow, and somewhat of the consistence of new bread. It serves as the principal food to the inhabitants of these islands, to procure which costs them nothing but the labour of climbing the tree. This tree, however, does not shoot up spontaneously; but if a man plants ten in his life-time, which he may do in about an hour, he will as completely fulfil his duty to his own and future generations, as the native of our less temperate climate can do by ploughing in the cold winter, and

those islands, a vessel, proper for the undertaking, was bought, and taken into dock at Deptford, to be provided with the necessary fixtures and preparations for executing the object of the voyage. These were completed according to a plan made by Sir JOSEPH BANKS, which, in the event, proved the most advantageous that could have been adopted for the intended purpose.

The ship was named *Bounty*. Lieutenant WILLIAM BLIGH was appointed to command her. The great cabin was appropriated for the preservation of the plants. It had two large sky-lights, and on each side three skuttles for air, and was fitted with a false floor cut full of holes to contain the garden-pots, in which the plants were to be brought home. The deck was covered with lead, and at the foremost corners of the cabin were fixed pipes to carry off the water that drained from the plants, into tubs placed below to save it for future use.

The ship was stored and victualled for eighteen months. In addition to the customary allowance of provisions, it was supplied with four krou, portable soup, essence of malt, and a proportion of barley and

and reaping in the summer's heat, as often as these seasons return: even if, after he has procured bread for his present household, he should convert a surplus into money, and lay it up for his children. From Captain COOK's *Voyage*, Vol. II.

wheat. The captain was likewise furnished with a quantity of iron-work and trinkets, to serve in his intercourse with the natives in the *South Seas*.

The *object* of all the former voyages to the *South Seas*, undertaken by the command of his present majesty, has been the advancement of science and the increase of knowledge. This voyage may be reckoned the first, the intention of which has been to derive *benefit* from those distant discoveries,

To Lieut. WILLIAM BLIGH, By the Commissioners for
commanding his Majesty's executing the office of
armed vessel the BOUNTY, Lord High Admiral of
at Spithead. GREAT BRITAIN and
IRELAND, &c.

WHEREAS the king, upon a representation from the merchants and planters interested in his majesty's WEST INDIA possessions, that the introduction of the bread-fruit tree into the islands of those seas, to constitute an article of food, would be of very essential benefit to the inhabitants, hath, in order to promote the interests of so respectable a body of his subjects (especially in an instance which promises general advantage) thought fit that measures

fures should be taken for the procuring some of those
 trees, and conveying them to the said WEST INDIA
 islands: and whereas the vessel under your command
 hath, in consequence thereof, been stored and victualled
 for that service, and fitted with proper conveniences and
 necessaries for the preservation of as many of the said
 trees as, from her size, can be taken on board her; and
 you have been directed to receive on board her the two
 gardeners named in the margin, who, from their know- David Nelson
and
Wm. Brown.
 ledge of trees and plants, have been hired for the pur-
 pose of selecting such as shall appear to be of a proper
 species and size:

You are, therefore, in pursuance of his majesty's
 pleasure, signified to us by Lord SYDNEY, one of his
 principal secretaries of state, hereby required and directed
 to put to sea in the vessel you command, the first favour-
 able opportunity of wind and weather, and proceed with
 her, as expeditiously as possible, round *Cape Horn*, to
 the SOCIETY ISLANDS, situate in the *southern*
ocean, in the latitude of about 18° south, and longitude
 of about 210° east from Greenwich, where, according
 to the accounts given by the late Captain COOK, and
 persons who accompanied him during his voyages, the
 bread-

bread-fruit tree is to be found in the most luxuriant state.

Having arrived at the above-mentioned islands, and taken on board as many trees and plants as may be thought necessary (the better to enable you to do which, you have already been furnished with such articles of merchandize and trinkets as it is supposed will be wanted to satisfy the natives) you are to proceed from thence through *Endeavour Streights* (which separate *NEW HOLLAND* from *NEW GUINEA*) to *Prince's Island*, in the *Streights of Sunda*, or, if it should happen to be more convenient, to pass on the eastern side of *Java* to some port on the north side of that island, where any *bread-fruit trees* which may have been injured, or have died, may be replaced by *Mangosteens*, *Durians*, *Jacks*, *Nancas*, *Lansas*, and other fine fruit trees of that quarter, as well as the *Rice Plant* which grows upon dry land; all of which species (or such of them as shall be judged most eligible) you are to purchase on the best terms you can from the inhabitants of that island, with the ducats with which you have also been furnished for that purpose; taking care, however, if the rice plants above mentioned cannot be procured at *Java*, to touch

touch at *Prince's Island* for them, where they are regularly cultivated.

From *Prince's Island*, or the *Island of Java*, you are to proceed round the *Cape of Good Hope* to the *WEST INDIES* (calling on your way thither at any places which may be thought necessary) and deposit one half of such of the above-mentioned trees and plants as may be then alive at his majesty's botanical garden at *St. Vincent*, for the benefit of the *Windward Islands*, and then go on to *Jamaica*: and, having delivered the remainder to Mr. *EAST*, or such person or persons as may be authorized by the governor and council of that island to receive them, refreshed your people, and received on board such provisions and stores as may be necessary for the voyage, make the best of your way back to *England*; repairing to *Spithead*, and sending to our secretary an account of your arrival and proceedings.

And whereas you will receive herewith a copy of the instructions which have been given to the above-mentioned gardeners for their guidance, as well in procuring the said trees and plants, and the management of them after they shall be put on board, as for bringing to *England* a small sample of each species, and such others as may be prepared by the superintendant of the botanical

garden at *St. Vincent's*, and by the said Mr. EAST, or others, for his majesty's garden at Kew; you are hereby required and directed to afford, and to give directions to your officers and company to afford, the said gardeners every possible aid and assistance, not only in the collecting of the said trees and plants at the places before mentioned, but for their preservation during their conveyance to the places of their destination.

Given under our hands the 20th November, 1787.

HOWE,

C. BRETT,

R. HOPKINS,

J. LEVESON GOWER.

By command of their Lordships,

P. STEPHENS.

After a voyage of ten months the ship *Bounty* arrived safe at OTAHEITE. As they drew nigh, a great number of canoes came off to them. Their first inquiry was, whether they were friends, and whether they came from *Britain*. They were no sooner satisfied in this, than they crowded on board in vast numbers, notwithstanding the endeavours which were made to prevent it; and

and in less than ten minutes, the deck was so full that the captain could scarce find his own people.

The next morning I went on shore, says Captain BLIGH, with the chief POENO, accompanied by a multitude of the natives. He conducted me to the place where we had fixed our tents in 1777, and desired that I would appropriate the spot to the same use. We then went across the beach, and through a walk delightfully shaded with *bread-fruit trees*, to his house. Here we found two women at work staining a piece of cloth red. These were his wife and her sister. They desired me to sit down on a mat, which was spread for the purpose, and with great kindness offered me refreshments. I received the congratulations of several strangers, who came up to us and behaved with great decorum and attention. The people, however, thronged about the house in such numbers that I was much incommoded by the heat, which being observed, they respectfully drew back. They made many enquiries after Sir JOSEPH BANKS, and many of their former friends. They said a ship had been there, from which they had learnt that Captain COOK was dead, but the circumstances of his death they did not appear to be acquainted with. The captain they called TONAH. I understood likewise from them that

Lieut. WATTS was in the ship; who, having been here in the *Resolution* with Captain COOK, was well known to them. In turn I very eagerly enquired after my friend OMAI; and it was a sensible mortification and disappointment to me to hear that not only OMAI, but both the New Zealand boys who had been left with him, were dead. Every one agreed in their information that they died a natural death. I next enquired about the cattle that had been left here by Captain COOK, but the accounts I received were very unfavourable, and so various, that for the present I shall forbear speaking of them. I had, however, the satisfaction to find that the island had received some benefit from our former visit. Two *shaddocks* were brought to me, a fruit which they had not till we introduced it. And among other things were *capscums*, *pumkins*, and two young *goats*.

This forenoon, a man came on board with Captain COOK's picture, which had been drawn by Mr. WEBBER, in 1777, and left with OTOO. It was brought to me, says Captain BLIGH, to be repaired. The frame was broken, but the picture no way damaged, except a little in the back ground. They called it TOOTE (which has always been their manner of pronouncing Captain COOK's

Cook's name). They said TOOTE had desired OTOO, whenever any English ship came, to shew the picture, and it would be acknowledged a token of friendship.

The next morning early, I received a message from OTOO, to inform me of his arrival from the back of the island, and requesting I would send a boat for him, which I immediately did, with an officer to conduct him on board. He came with numerous attendants, and expressed much satisfaction at our meeting. After introducing his wife to me, we *rubbed our noses together*, which is the customary manner of saluting.

I was surprised to find, that, instead of OTOO, the name by which he formerly went, he was now called TINAH. The name of TINAH's wife was IDEAH: with her was a woman, dressed with a large quantity of cloth, in the form of a hoop, which was taken off and presented to me, with a large hog, and some bread-fruit. I then took my visitors into the cabin, and after a short time produced my presents in return.

The present I made to TINAH (by which name I shall hereafter call him) consisted of hatchets, small adzes, files, gimblets, saws, looking-glasses, red feathers, and two shirts. To IDEAH I gave ear-rings, necklaces,

and beads; but she expressed her desire for the utensils of iron.

Much conversation took place among them on the value of the different articles, and they appeared extremely satisfied; so that they determined to spend the day with me.

In the evening TINAH desired me to fire some of the great guns: this I readily complied with, and, as the shot fell into the sea at a great distance, all the natives expressed their approbation by loud shouts and acclamations.

I had a large company at dinner; for, besides TINAH and his wife, there was OTOW, the father of TINAH, OREPYAH, and WHYDOAH, two of his brothers, PAENO, and several other chiefs.

TINAH is a very large man, much above the common stature, being not less than six feet four inches in height, and proportionably stout: his age about thirty-five.

His wife (IDEAH) I judged to be about twenty-four years of age: she is likewise much above the common size of the women of *Otaheite*, and has a very animated and intelligent countenance.

WHYDOAH, the younger brother of TINAH, was highly

highly spoken of as being a great warrior, and had also the reputable character of being the greatest drunkard in the country; and indeed, to judge from the withered appearance of his skin, he must have used the *ava* to excess.

TINAH was fed by one of his attendants, who sat by him only for that purpose, this being a particular custom among some of the superior chiefs; and I must do him the justice to say, he excelled in this as his brother did in drinking, as he kept his attendant in constant employment: there was indeed little reason to complain of want of appetite in any of the guests.

As the women are not allowed to dine in company with the men, IDEAH dined with some of her companions, about an hour afterwards, in private, except that her husband TINAH favoured them with his company, and seemed to have entirely forgotten that he had already dined.

TINAH continued with me the whole afternoon, in the course of which he eat (having requested it) *four times* of pork, *besides* his dinner.

In the morning I returned TINAH's visit. I made him understand, that my visit was designed as a particular compliment to him, and gave him a second present,

sent, equal to the first, which he received with great pleasure; and to the people of consequence, that were about him, I also presented some article or other. There were a great number of children; and, as I took notice of the little ones that were in arms and gave them beads, both small and great, but with much drollery and good humour, endeavoured to profit by the occasion. Boys, and even grown up persons, were caught up in arms and brought to me, which created much laughter; so that in a short time I got rid of all I had brought on shore.

My next object was to go to *Opur*, to see if NELSON could be able to procure any plants there, but I gave the credit of my visit to young *Otōo*, the eldest son of *TINAH*, and who had taken his name.

I prepared a magnificent present for this youth, who was represented to me as a person of the highest rank in the island.

TINAH, understanding from my conversation that I intended visiting some of the neighbouring islands, very earnestly requested I would not think of leaving *Matawai*. "Here," said he, "you shall be supplied plentifully with every thing you want. All here are your friends, and friends of King *GEORGE*: if you go to

"the

"the other islands, you will have every thing stolen from you." I replied, that, on account of their good will, and from a desire to serve him and his country, King GEORGE had sent out those valuable presents to him; and will not you, TINAH, send something to King George in return? "Yes," he said, "I will send him any thing I have;" and then began to enumerate the different articles in his power, among which he mentioned the BREAD-FRUIT. This was the exact point to which I wished to bring the conversation; for I had given directions to every one on board not to make known to the islanders the purpose of our coming, lest it might enhance the value of the *bread-fruit* plants, or occasion other difficulties; and, seizing an opportunity which had every appearance of being undesigned and accidental, I told him the *bread-fruit trees* were what I was sure King GEORGE would like; upon which he promised me a great many should be put on board, and seemed much delighted to find it so easily in his power to send any thing that would be well received by King GEORGE.

The next day I sent Mr. CHRISTIAN with a party to erect our tent, and soon after followed him myself.

With the consent of TINAH, MOANNAH, and POENO,

I fixed

I fixed a boundary, within which the natives were not to enter without leave, and the chiefs cautioned them against it. The principal use of the tents on shore was for a lodgment for the plants; which, instead of appearing to receive as a favour, I brought the chiefs to believe I was doing them a great honour in carrying these plants as a present from them to the EAREE RABIE NO BRITANNEE. The party at the tent consisted of nine persons, including NELSON and his assistant.

TINAH dined with me on board, and was to-day my only visitor: nevertheless, the ceremony of being fed he so scrupulously observed, that, even after all the attendants were sent away, and we were left by ourselves, I was obliged to feed him myself.

I had frequently large companies to dine with me. Some of my constant visitors had observed that we always drank the king's health, as soon as the cloth was removed; but they were by this time so fond of wine, that they would frequently remind me of the health in the middle of dinner, by calling out King GEORGE EAREE NO BRITANNEE; and would banter me if the glass was not filled to the brim. Nothing could exceed the mirth and jollity of these people when they met on board.

MONDAY,

MONDAY, JANUARY 5, 1789. At the relief of the watch, four o'clock in the morning, the small cutter was missing. I was immediately informed of it, and mustered the ship's company; when it appeared that three men were absent, Charles CHURCHILL, the ship's corporal; and two of the seamen, William MUSPRAT, and John MILLWARD. They had taken with them eight stand of arms and ammunition; but what their plan was, or which way they had gone, no one on board seemed to have the least knowledge. I went on shore to the chiefs, and soon received information that the boat was at *Matavai*; and that the deserters had departed in a sailing canoe for the island TETHUKOA.

On this intelligence I sent the master to *Matavai* to search for the small cutter, and one of the chiefs went with him; but before they had got half way, they met the cutter with five of the natives, who were bringing her back to the ship. This service, rendered me by the people of *Matavai*, pleased me much, and I rewarded the men accordingly.

I told TINAH and other chiefs, that I expected they would get the deserters brought back; for that I was determined not to leave *Otaheite* without them. They assured me, that they would do every thing in their

power to have them taken; and it was agreed that OREPYAH and MOANNAH should depart the next morning for *Tetburoa* to seize them.

THURSDAY, JANUARY 22, 1789. This afternoon I received a message from TEPPAHOO, to inform me that our deserters had roamed about, but were now at *Jatuba*. I ordered the cutter to be got ready, and a little before sun-set left the ship, taking ADIDE with me. When we arrived at TEPPAHOO's house, we were very kindly received by him and his wife. The deserters, he informed me, were in a house close to us, and I imagined there would not be much difficulty in securing them with the assistance of the natives. They had heard of my arrival; and when I was near the house, they came out, without their arms, and delivered themselves up.

I learnt from the deserters, that at *Tetburoa* they had seen OREPYAH and MOANNAH, who had made an attempt to secure them. They said it was their intention to have returned to the ship; and it is probable that they were so much harassed by the natives watching for an opportunity to surprise them, that they might wish to have the merit of returning of their own accord, to avoid the disgrace of being seized and brought back.

FRIDAY

FRIDAY, FEBRUARY 6. An occurrence happened to-day that gave me great concern, not only on account of the danger with which the ship had been threatened, but as it tended to diminish the confidence and good understanding which had hitherto been constantly preserved between us and the natives. The wind had blown fresh in the night, and at day-light we discovered that the cable, by which the ship rode, had been cut near the water's edge, in such a manner, that only one strand remained whole.

While we were securing the ship, TINAH came on board. I could not but believe he was perfectly innocent of the transaction; nevertheless, I spoke to him in a very peremptory manner, and insisted upon his discovering and bringing to me the offender.

My suspicions fell chiefly, I may say wholly, on the strangers that came to us from other parts of the island; for we had on every occasion received such unrelieved and unaffected marks of good will from the people of *Matavai* and *Opar*, that in my own mind I entirely acquitted them.

The anger which I expressed, however, created so much alarm, that old Otow and his wife (the father and mother of TINAH) immediately quitted *Opar*, and

retired to the mountains in the midst of heavy rain, as did TEPPAHOO and his family.

TINAH and IDEAH expostulated with me on the unreasonableness of my anger against them. He said, he would exert his utmost endeavours to discover the guilty, that most probably the attempt had been made by people from the other islands out of enmity to the inhabitants of *Matavai* and *Opar*, every one knowing the partiality I had for them, and that I had declared I would protect them against their enemies.

All this I believed, but I did not think proper to appear perfectly satisfied, lest TINAH, who was naturally very indolent, should not be active in his endeavours to detect the offender.

Saturday passed without my seeing any thing of TINAH the whole day. The next morning, he and IDEAH came to me, and assured me they had made the strictest enquiries concerning the injury intended us, but had not been able to discover any circumstance which could lead them to suspect who were concerned in it. This was not at all satisfactory, and I behaved to them with great coolness, at which they were much distressed; and IDEAH, at length, gave vent to her sorrow by tears. I could no longer keep up the appearance of mistrusting them ;

them; but I earnestly recommended to them, as they valued the king of England's friendship, that they would exert their utmost endeavours to find out the offenders, which they faithfully promised. Our reconciliation accordingly took place, and messengers were sent to OTOW and TEPPAHOO to invite them to return.

It has since occurred to me, that this attempt to cut the ship adrift, was most probably the act of some of our own people; whose purpose of remaining at *Otaheite* might have been effectually answered if the ship had been driven on shore. At the time, I entertained not the least thought of this kind, nor did the possibility of it enter into my ideas, having no suspicion that so general an inclination, or so strong an attachment to these islands, could prevail among my people, as to induce them to abandon every prospect of returning to their native country.

TUESDAY, MARCH 31. To day, all the plants were on board, being in 74 pots, 39 tubs, and 24 boxes. The number of *bread-fruit* plants were 1015; besides which we had collected a number of other plants. The *avee*, which is one of the finest flavoured fruits in the world. The *ayyah*, which is a fruit not so rich, but of a fine

a fine flavour and very refreshing. The *rattab*, not much unlike a chestnut, which grows on a large tree, in great quantities: they are singly in large pods, from one to two inches broad; and may be eaten raw, or boiled in the same manner as Windsor beans, and so dressed, are equally good. The *orai-ab*, which is a very superior kind of plantain. All these I was particularly recommended to collect by Sir JOSEPH BANKS. I had also taken on board some plants of the *ettow* and *matte*, with which the natives here make a beautiful red colour; and a root called *peeah*, of which they make an excellent pudding.

FRIDAY, APRIL 3. TINAH and his wife, with his parents, brothers, and sister, dined with me to-day, and, as I meant to sail early next morning, they all remained on board for the night. The ship was crowded the whole day with the natives, and we were loaded with cocoa-nuts, plantains, bread-fruit, hogs, and goats. In the evening there was no dancing or mirth on the beach, such as we had been accustomed to, but all was mournful silence.

All the while we remained at *Otabelle*, the picture of Captain COOK, at the desire of TINAH, was kept on board

board the ship. On delivering it to him, I wrote on the back, the time of the ship's arrival and departure, with an account of the number of plants on board.

SATURDAY, APRIL 4. At day-light we unmoored. At half past six, there being no wind, we weighed, and towed the ship out of harbour. Soon after the sea breeze came, and we stood off towards the sea. At five I set we had farewell to *Otaheite*, where for twenty-three weeks we had been treated with the utmost affection and regard, and which seemed to increase in proportion to our stay. That we were not insensible to their kindness, the events which followed more than sufficiently prove: for to the friendly and endearing behaviour of these people, may be ascribed the motives for that event which effected the ruin of an expedition that, there was every reason to hope, would have been completed in the most fortunate manner.

We stood to the northward all night, with light winds, and on the 27th of April 1789, at noon, were between the islands *Tafoa* and *Kotoo*.

Thus far the voyage had advanced in a course of uninterrupted prosperity, and had been attended with many circumstances equally pleasing and satisfactory. A very different scene was, however, soon to take place. A conspiracy

conspiracy was formed, which was to render all our past labour productive only of misery and distress. The means was concerted and prepared with so much secrecy and circumspection, that no one circumstance occasioned the smallest suspicion of the impending calamity.

TUESDAY, APRIL 28. Just before sun-rising, while I was yet asleep, Mr. CHRISTIAN, with the master at arms, gunner's mate, and Thomas BURKITT, seaman, came into my cabin, and seizing me, tied my hands with a cord behind my back, threatening me with instant death if I spoke or made the least noise: I, however, called as loud as I could, in hopes of assistance; but they had already secured the officers who were not of their party, by placing centinels at their doors. There were three men at my cabin door, besides the four within. CHRISTIAN had only a cutlass in his hand, the others had muskets and bayonets.

I was hauled out of bed, and forced on deck in my shirt, suffering great pain from the tightness with which they had tied my hands.

I demanded the reason of such violence, but received no other answer than abuse, for not holding my tongue.

The master, the gunner, the surgeon, Mr. ELPHINSTONE,

STONE, master's mate, and NELSON, were kept confined below; and the fore hatchway was guarded by sentinels.

The boatswain and carpenter, and also the clerk, Mr. SAMUEL, were allowed to come upon deck, where they saw me standing abaft the mizen-mast, with my hands tied behind my back, under a guard, with CHRISTIAN at their head.

The boatswain was ordered to hoist the launch out, with a threat, if he did not do it instantly, to take care of himself.

When the boat was out, Mr. HAYWARD and Mr. HALLET, two of the midshipmen, and Mr. SAMUEL, were ordered into it.

I demanded what their intention was in giving this order, and endeavoured to persuade the people near me not to persist in such acts of violence; but it was to no effect: Hold your tongue, sir, or you are dead this instant, was constantly repeated to me.

I continued my endeavours to turn the tide of affairs, when CHRISTIAN changed the cutlafs which he had in his hand for a bayonet that was brought to him, and, holding me with a strong gripe by the cord that tied my hands, he with many oaths threatened to kill me imme-

diately, if I would not be quiet: the villains round me had their pieces cocked and bayonets fixed.

Particular people were called on to go into the boat, and were hurried over the side; whence I concluded that with these people I was to be set adrift: I therefore made another effort to bring about a change, but with no other effect than to be threatened with having my brains blown out.

The boatwain and seamen who were to go in the boat, were allowed to collect twine, canvas, lines, sails, cordage, an eight-and-twenty gallon cask of water, and Mr. SAMUEL, foreseeing what was to happen, got an hundred and fifty pounds of bread, with a small quantity of rum and wine, also a quadrant and compass: but he was forbidden, on pain of death, to touch either map, ephemeris, book of astronomical observations, sextant, time-keeper, or any of my surveys or drawings.

The mutineers having forced those of the seamen, whom they meant to get rid of, into the boat, CHRISTIAN directed a dram to be served to each of his own crew. I then unhappily saw that nothing could be done to effect the recovery of the ship: there was no one to assist me, and every endeavour on my part was answered with threats of death.

The

The officers were next called upon deck, and forced over the side into the boat, while I was kept apart from every one, abaft the mizen-mast; CHRISTIAN, armed with a bayonet, holding me by the bandage that secured my hands:

The guard round me had their pieces cocked, but on my daring the wretches to fire, they uncocked them.

Isaac MARTIN, one of the guard over me, I saw, had an inclination to assist me, and as he fed me with shaddock (my lips being quite parched) we explained our wishes to each other by our looks; but this being observed, Martin was removed from me.

He then attempted to leave the ship, for which purpose he got into the boat; but with many threats they obliged him to return.

The armourer, Joseph COLEMAN, and two carpenters, MACINTOSH and NORMAN, were also kept contrary to their inclinations; and they begged of me, after I was astern in the boat, to remember that they declared they had no hand in the transaction. Michael BYRNE likewise wanted to leave the ship.

It is of no moment for me to recount my endeavours to bring back the offenders to a sense of their duty: all I

could do was by speaking to them; but it was to no purpose, for I was kept securely bound, and no one, except the guard, suffered to come near me.

To Mr. SAMUEL I am indebted for securing my journals and commission, with some material ship papers.

Without these I had nothing to certify what I had done, and my honour and character might have been suspected, without my possessing a proper document to have defended them. All this he did with great resolution though strictly guarded. He attempted to save the time-keeper, and a box with my surveys, drawings, and remarks for fifteen years past, which were numerous; when he was hurried away, with, "Damn your eyes, you are well off to get what you have."

It appeared to me, that CHRISTIAN was some time in doubt whether he should keep the carpenter or his mates; at length he determined on the latter, and the carpenter was ordered into the boat. He was permitted, but not without great opposition, to take his tool chest.

Much altercation took place among the mutinous crew during the whole business: some swore, "I'll be damned if he does not find his way home, if he gets
" any

"any thing with him," meaning me; and, when the carpenter's chest was carrying away, "Damn my eyes, he will have a vessel now." While others laughed at the *helpless situation* of the boat, being very deep, and so little room for those who were in her. As for CHRISTIAN, he appeared like a madman.

The officers and men being in the boat, they only waited for me, of which the master at arms informed CHRISTIAN; who then said, "Come, Captain BLIGH, your officers and men are now in the boat, and you must go with them; if you attempt to make the least resistance you shall instantly be put to death;" and without further ceremony, with a tribe of armed ruffians about me, I was forced over the side, where they untied my hands.

Being in the boat, we were veered astern by a rope. A few pieces of pork were thrown to us, and some clothes, also four cutlasses; and it was then that the armourer and carpenters called out to me to remember that they had no hand in the transaction.

After having undergone a great deal of ridicule, and been kept some time to make sport for these unfeeling wretches, we were at length cast adrift upon the wide ocean.

I had

I had with me in the boat the following persons:

Names.	Stations.
John FRVER,	Master.
Thomas LEDWARD,	Acting Surgeon.
David NELSON,	Botanist.
William PECKOVER,	Gunner.
William COLE,	Boatswain.
William PURCELL,	Carpenter.
William ELPHINSTONE,	Master's Mate.
Thomas HAYWARD,	Midshipman.
John HALLET,	Ditto.
John NORTON,	Quarter-master.
Peter LINKLETTER,	Ditto.
Lawrence LEBOGUE,	Sail-maker.
John SMITH,	Cook.
Thomas HALL,	Ditto.
George SIMPSON,	Quarter-master's Mate.
Robert TINKLER,	A Boy.
Robert LAMB,	Butcher.
Mr. SAMUEL,	Clerk.

There

There remained on board the *Bounty*,

Fletcher CHRISTIAN, - - - - - *Master's Mate.*

CHRISTIAN, the head of the mutineers, is of a respectable family in the north of England. This was the third voyage he had made with me; and, as I found it necessary to keep my ship's company at three watches, I had given him an order, the night previous to the mutiny, to take charge of the third, his abilities being thoroughly equal to the task.

Peter HAYWOOD, - - - - - *Midshipman.*

HAYWOOD is also of a respectable family in the north of England, and a young man of abilities, as well as CHRISTIAN. These two had been objects of my particular regard and attention, and I had taken great pains to instruct them, having entertained hopes, that, as professional men, they would have become a credit to themselves and their country.

Edward YOUNG, - - - - - *Midshipman.*

YOUNG was well recommended, and had the look of an able stout seaman: he, however, fell short of what his appearance promised.

Edward STEWART, - - - - - *Midshipman.*

STEWART was a young man of creditable parents in the *Orkneys*; at which place, on the return of the *Resolution* from the *SOUTH SEAS* in 1780, we received so many civilities, that, on that account only, I should gladly have taken him with me: but, independent of this recommendation, he was a seaman, and had always borne a good character.

Charles CHURCHILL, - - - - - *Master at Arms.*

John MILLS, - - - - - *Gunner's Mate.*

James MORRISON, - - - - - *Ditto.*

Thomas BURKITT, - - - - - *Boatswain's Mate.*

Matthew QUINTAL, - - - - - *Able Seaman.*

John

Names.	Station.
John SUMNER, - - - - -	<i>Able Seaman.</i>
John MILLWARD, - - - - -	<i>Ditto.</i>
William MACKOY, - - - - -	<i>Ditto.</i>
Henry HILLBRANT, - - - - -	<i>Ditto.</i>
Michael BYRNE, - - - - -	<i>Ditto.</i>
William MUSPRAT, - - - - -	<i>Ditto.</i>
Alexander SMITH, - - - - -	<i>Ditto.</i>
John WILLIAMS, - - - - -	<i>Ditto.</i>
Thomas ELLISON, - - - - -	<i>Ditto.</i>
Isaac MARTIN, - - - - -	<i>Ditto.</i>
Richard SKINNER, - - - - -	<i>Ditto.</i>
Matthew THOMPSON, - - - - -	<i>Ditto.</i>
William BROWN, - - - - -	<i>Gardener.</i>
Joseph COLEMAN, - - - - -	<i>Armourer.</i>
Charles NORMAN, - - - - -	<i>Carpenter's Mate.</i>
Thomas MACINTOSH, - - - - -	<i>Carpenter's Crew.</i>

In all 25 hands, and the most able men of the ship's company.

Notwithstanding the roughness with which I was treated, the remembrance of past kindnesses produced some signs of remorse in CHRISTIAN. When they were forcing me out of the ship, I asked him, "if this treatment was a proper return for the many instances he had received of my friendship?" He appeared disturb-

ed at my question, and said, with much emotion, "It is that, Captain BLIGH, which affects me, and makes me in hell."

Having little or no wind, we rowed pretty fast toward *Tofa*, which bore NE about 10 leagues from us.

While the ship was in sight she steered NNW, but I considered this only as a feint; for when we were at a distance, "*Huzza for Otabeite*," was frequently heard among the mutineers.

As soon as I had time to reflect, I felt an inward satisfaction, which prevented any very great depression of spirits: conscious of my integrity, and anxious solicitude for the good of the service in which I had been engaged, I found my mind very much supported, and began to conceive hopes, notwithstanding so heavy a calamity, that I should one day be able to account to my king and country for the misfortune.

A few hours before, my situation had been peculiarly flattering. I had a ship in the most perfect order, and well stored with every necessary both for service and health: by early attention to those particulars, I had, as much as lay in my power, provided against any accident, in case I could not get through *Endeavour Straits*, as well as against what might befall me in them; added to

this, the plants had been successfully preserved in the most flourishing state: so that, upon the whole, the voyage was two thirds completed, and the remaining part, to all appearance, in a very promising way; every person on board being in perfect health, to establish which was ever amongst the principal objects of my attention.

It may be very naturally asked, what could be the reason for such a revolt? In answer to which I can only conjecture, that the mutineers had flattered themselves with the hopes of a more happy life among the *Otaheiteans*, than they could possibly enjoy in England; and this, joined to some female connections, most probably occasioned the whole transaction.

The women of *Otaheite* are handsome, mild, and cheerful in their manners and conversation, possessed of great *sensibility*, and have sufficient *delicacy* * to make them

* *Modesty* is one of the most distinguishing and *attractive* characteristics of the female sex. *Modesty* has a double effect: it heightens the desire of the male, and deters him from rudeness, or improper behaviour. It both *attracts* and *repels*. There is no part of the female character which men revere so much as *modesty*. It is the brightest and most valuable jewel with which a woman can be adorned. A fine woman without *modesty*, instead of gaining the affections of men, becomes an object of contempt. It is, therefore, not only the interest of females to cultivate *modesty*, but to guard, with the most anxious

them admired and beloved. The chiefs were so much attached to our people, that they rather encouraged their stay among them than otherwise.

Under these, and many other attendant circumstances equally desirable, it is now perhaps not so much to be wondered at, though scarcely possible to have been foreseen, that a set of sailors, most of them void of connection, should be led away; especially when, in addition to such powerful inducements, they imagined it in their power to fix themselves in the midst of plenty, on one of the finest islands in the world, where they need not anxious attention, against the smallest encroachments. Every attack, however apparently insignificant, should be repelled with spirit and intrepidity. To men of sensibility a single glance of the eye will tell them that their conduct is improper, and make them not only instantly desist, but prevent any future attempt. It is equally the interest of men to cherish, and not to injure by indelicacy, a quality from which they derive so much pleasure and advantage.

Hail, MODESTY! fair female honour, hail!
Beauty's *chief ornament*, without whose charms
beauty disgusts; or gives but vulgar joys.

CHEAPNESS offends; hence on the *harlot's* lip
no rapture hangs, however fair she seem,
however form'd for love and amorous play.

THOU giv'st the smile its grace; the heighten'd kiss
its balmy essence sweet! &c.

ARMSTRONG.

It is curious to observe the power of this quality in the present instance over
rude minds.

3 T 2

labour,

labour, and where the allurements of dissipation are beyond any thing that can be conceived.

The utmost, however, that any commander could have supposed to have happened is, that some of the people would have been tempted to desert. But if it should be asserted, that a commander is to guard against an act of mutiny and piracy in his own ship, more than by the common rules of service; it is as much as to say that he must sleep locked up, and when awake be girded with pistols, and walk among his men as amidst a gang of robbers.

Desertions have happened, more or less, from most of the ships that have been at the *Society Islands*; but it has always been in the commander's power to make the chiefs return their people: the knowledge, therefore, that it was *unsafe* to desert, perhaps, first led mine to consider with what ease so small a ship might be surprised, and that so favourable an opportunity would never offer to them again.

The *secrecy* of this mutiny is beyond all conception. Thirteen of the party, who were with me, had always lived forward among the seamen; yet neither they nor the messmates of CHRISTIAN, Stewart, Haywood, and

Young, had ever observed any circumstance that made them in the least *suspect* what was going on.

To such a close planned act of villany, my mind being entirely free from any suspicion, it is not wonderful that I fell a sacrifice. Had their mutiny been occasioned by any grievances, either real or imaginary, I must have discovered symptoms of their discontent, which would have put me on my guard: but the case was far otherwise. I slept with the door of my cabin always open, that the officer of the watch might have access to me on all occasions, the possibility of such a conspiracy being ever the farthest from my thoughts. CHRISTIAN, in particular, I was on the most friendly terms with; that very day he was to have dined with me; and the preceding night he excused himself from supping with me on pretence of being unwell; for which I felt concerned, having no suspicion of his integrity and honour.

Fortunately it was calm all the afternoon, till about four o'clock, when we were so far to windward, that, with a moderate easterly breeze which sprung up, we were able to sail. It was nevertheless dark when we got to *Tofoa*, where I expected to land to seek a supply of bread-

bread-fruit and water. But the shore proved to be so steep and rocky, that we were obliged to give up all thoughts of it, and keep the boat under the lee of the island with two oars: for there was no anchorage. Having fixed on this mode of proceeding for the night, I served to every person half a pint of grog, and each took to his rest as well as our unhappy situation would allow.

WEDNESDAY, APRIL 29. In the morning, at dawn of day, we rowed along shore in search of a landing place, and about ten o'clock we discovered a cove with a stony beach, at the NW part of the island, where I dropt the grapnel within 20 yards of the rocks. A great surf ran on the shore; but, as I was unwilling to diminish our stock of provisions, I landed Mr. SAMUEL, who climbed the cliffs, and got into the country in search of supplies. It was great consolation to me to find, that the spirits of my people did not sink, notwithstanding our miserable and almost hopeless situation. Towards noon Mr. SAMUEL returned, with a few quarts of water which he had found in holes; but he had met with no spring, or any prospect of a sufficient supply in that particular, and had seen only the signs of inhabitants,

inhabitants. As it was uncertain what might be our future necessities, I only issued a morsel of bread, and a glass of wine, to each person for dinner.

At day-light, we attempted to put to sea; but the wind and weather proved so bad, that I was glad to return to our former station near the cove; where, after issuing a morsel of bread and a spoonful of rum to each person, we landed, and I went off with Mr. NELSON, Mr. SAMUEL, and some others, into the country in search of provisions.

We found a few deserted huts, and a small plantain walk, from which we collected three small branches of plantains. After passing this place, we came to a deep gully that led towards a mountain, near a *volcano*; and, as I conceived that in the rainy season very great torrents of water must pass through it, we hoped to find sufficient for our use remaining in some holes of the rocks; but, after all our search, the whole that we collected was only nine gallons. We advanced within two miles of the foot of the highest mountain in the island, on which is the volcano, which is almost constantly burning. The country near it is covered with *lava*, and has a most dreary appearance. As we had not been fortunate in our discoveries, and saw nothing to alleviate our distresses,

trefs, except the plantains and water above mentioned, we returned to the boat exceedingly fatigued and faint. Every person being returned by noon, I gave about an ounce of pork and two plantains to each, with half a glass of wine. The people who remained with the boat I had directed to look for fish, or what they could pick up about the rocks; but nothing eatable could be found: so that, upon the whole, we considered ourselves on as miserable a spot of land as could well be imagined.

About two o'clock in the afternoon another party set out; but, after suffering much fatigue, they returned in the evening without any kind of success.

At the head of the cove, about 150 yards from the water side, there was a *cave*. This situation secured us from the danger of being surpris'd, and I determin'd to remain on shore for the night, with a part of my people, that the others might have more room to rest in the boat with the master; whom I directed to be watchful, in case we should be attacked. I ordered one plantain for each person to be boiled; and having supped on this scanty allowance, with a quarter of a pint of grog, and fix'd the watches for the night, those whose turn it was laid down to sleep in the cave, before which we kept up
a good

a good fire, notwithstanding which we were much troubled with flies and musquitoes.

FRIDAY, MAY 1. At dawn of day, a party was sent out by a different route, to see what they could procure. They however only met with two men, a woman, and a child, who accompanied them to the cove with two cocoa-nut shells of water. I endeavoured to make friends of these people, and sent them away for bread-fruit, plantains, and water. Soon after other natives came to us; and by noon there were thirty about us, from whom we obtained a small supply; but I could only afford one ounce of pork, and a quarter of a bread-fruit, to each man for dinner, with half a pint of water; for I was fixed in my resolution not to use, as yet, any of the bread or water in the boat.

Some of the natives were coming and going the whole afternoon, and we got enough of bread-fruit, plantains, and cocoa nuts, for another day; but of water they only brought us about five pints. A canoe also came to us with four men, and brought a few cocoa-nuts and bread-fruit, which I bought with buttons and a few beads as I had done the rest.

Towards evening, I had the satisfaction to find our stock of provisions somewhat increased. At sun-set all

the natives left us in quiet possession of the cave. I thought this a good sign, and made no doubt that they would come again next day with a better supply of food and water, and we should obtain sufficient to stock us for our intended voyage.

At night, I served a quarter of a bread-fruit and a cocoa-nut to each person for supper; and, a good fire being made, all but the watch went to sleep.

At day-break, next morning, I was pleased to find every one's spirits a little revived, and that they no longer regarded me with those anxious looks, which had constantly been directed towards me since we lost sight of the ship: every countenance appeared to have a degree of cheerfulness, and they all seemed determined to do their utmost.

As there was no direct certainty of our being supplied with water by the natives, I sent a party among the gullies in the mountains, with empty shells, to see what could be found. In their absence the natives came about us, as I expected, and in greater numbers; two canoes also came in from round the north side of the island. In one of them was an elderly chief. Soon after, some of our foraging party returned, and with them came Errow, a chief. To each of these men I made a present of an old

old shirt and a knife. They were very inquisitive to know in what manner I had lost my ship. During this conversation, a young man, named NAGETE, appeared, whom I remembered to have seen in 1777: he expressed much pleasure at our meeting. The goodwill and affability of this man gave me much satisfaction.

This, however, was but of short duration, for the natives began to increase in number, and I observed some symptoms of a design against us. Soon after they attempted to haul the boat on shore, on which I brandished my cutlass in a threatening manner, and spoke to EFOW to order them to desist; which they did, and every thing became quiet again. As we had no means of improving our situation, I told our people I would wait till sun-set, by which time, perhaps, something might happen in our favour: for if we attempted to go at present, we must fight our way through, which we could do more advantageously at night; and that in the mean time we should endeavour to get off to the boat what we had bought.

The beach was lined with the natives, and we heard nothing but the knocking of stones together, which

they had in each hand. I knew very well this was the sign of an attack. They frequently importuned me to sit down, but I as constantly refused: for it occurred both to NELSON and myself, that they intended to seize hold of me, if I gave them such an opportunity. At noon I served a cocoa-nut and a bread-fruit to each person for dinner, and gave some to the chiefs, with whom I continued to appear intimate and friendly. Keeping, therefore, constantly on our guard, we were suffered to eat our uncomfortable meal in some quietness.

After dinner we began by little and little to get our things into the boat, which was a troublesome business, on account of the surf. I carefully watched the motions of the natives, who continued to increase in number; and found that, instead of their intention being to leave us, fires were made, and places fixed on for their stay during the night. Consultations were also held among them, and every thing assured me we should be attacked. I sent orders to the master, that when he saw us coming down, he should keep the boat close to the shore, that we might the more readily embark, and in sending this paper down to the boat, it was nearly *snatched away*, but for the timely assistance of the gunner.

When

When the sun began to set, I gave the word, on which every person who was on shore with me boldly took up his proportion of things, and carried them to the boat.

The chiefs eagerly asked of me, if I did not intend sleeping in the cave as on the preceding night. I said, "No; but in the morning we will again trade with you, and I shall remain till the weather is moderate, when we go, as we have agreed, to *Tongataboo*."

The elder chief then started up, and said, "You will not sleep on shore, then *mattie*," which means, we will kill you instantly, and he left us.

The onset was now prepared. Every one made a noise with the stones he held in his hand, and EFOW ran from us.

All but two or three things were in the boat, when I took NAGETE by the hand, and our people walked down the beach, every one in a silent kind of horror.

While I was seeing them embark, NAGETE requested me to have a conference with EFOW; but I found EFOW was encouraging them to make the instant attack, and it was my determination, if they had *then* began, to have killed NAGETE, for his treacherous behaviour. I ordered the carpenter not to quit me till the other people were in the boat. NAGETE, finding I would

would not stay, violently loosed himself from my hold, and ran off, and we all got into the boat except one man, who, while I was getting on board, quitted it, and with undaunted bravery ran up the beach to cast the stern-fast off, notwithstanding the master and others called on him to return, while they were hauling me out of the water.

I was no sooner in the boat than the attack was begun by about *two hundred men*; the unfortunate sailor who had run up the beach was knocked down, and the stones flew like a shower of shot. Many Indians got hold of the stern-rope, and were near hauling the boat on shore; which they would certainly have effected, if I had not had a knife in my pocket, with which I cut the rope. At this time I saw five of the natives about the poor man they had killed, and two of them were beating him about the head with stones in their hands.

We had no time to reflect, for, to my surprise, they filled their canoes with stones, and twelve men came off after us to renew the attack, which they did so effectually as nearly to disable us all. Our grapnel was foul, but fortunately the fluke broke, and we got to our oars, and pulled to sea. They, however, could paddle round us, so that we were obliged to sustain the attack without
being

being able to return it, except with such stones as lodged in the boat, and in this I found we were very inferior to them. We could not close, because our boat was lumbered and heavy, of which they well knew how to take advantage: I therefore adopted the expedient of throwing overboard some clothes, which, as I expected, they stopped to pick up; and, as it was by this time almost dark, they gave over the attack, and returned towards the shore, leaving us to meditate on our unhappy situation.

The poor man killed by the natives was John Norton: this was his second voyage with me as quartermaster, and his worthy character made me lament his loss very much. He has left an aged parent, I am told, whom he supported.

Taking this as a sample of the disposition of the natives, there was but little reason to expect much benefit by persevering in the intention of visiting *Tongataboo*; for I considered their good behaviour formerly to have proceeded, like that of these people, from a dread of our fire arms, and which, therefore, was likely to cease as soon as they knew we were destitute of them: and, even supposing they would not destroy us, the boat, and every thing we had which they considered of value,

would most probably be taken from us, and thereby all hopes precluded of ever being able to revisit our native country.

We therefore set our sails, and steered along shore by the west side of the island *Tofoa*; the wind blowing fresh from the eastward.

My mind was now busily employed in considering what was best to be done, when I was solicited by all hands to take them towards home:—and when I told them that no hopes of relief remained for us (except what might be found at *New Holland*) till I came to *TIMOR*, a distance of full 1200 leagues, where there was a Dutch settlement, but in what part of the island I knew not,—to effect which, they all agreed to live on *one ounce of bread, and a quarter of a pint of water per day*. Therefore, after examining our stock of provisions, and recommending to them, in the most solemn manner, not to depart from their promise, we bore away across a sea, where the navigation is but little known, in a small boat, twenty-three feet long from stem to stern deep laden with *eighteen men*. I was happy, however, to see that every one seemed better satisfied with our situation than myself.

Our stock of provisions consisted of about one hundred

and

and fifty pounds of bread, twenty-eight gallons of water, twenty pounds of pork, three bottles of wine, and five quarts of rum. A few cocoa-nuts were in the boat, and some bread-fruit, but the latter was trampled to pieces.

It was about eight o'clock at night when we bore away under a reefed lug fore-sail: and, having divided the people into watches, and got the boat in a little order, we returned GOD thanks for our miraculous preservation, and, fully confident of his gracious support, I found my mind more at ease than it had been for some time past.

At day-break the gale increased; the sun rose very fiery and red, a sure indication of a severe gale of wind. At eight it blew a violent storm, and the sea ran very high, so that between the seas the sail was becalmed, and when on the top of the sea it was too much to have set: but we could not venture to take in the sail, for we were in very imminent danger and distress, the sea curled over the stern of the boat, which obliged us to bale with all our might. A situation more distressing has, perhaps, seldom been experienced.

Our bread was in bags, and likely to be spoiled by the wet: to be starved to death was inevitable, if this could

not be prevented. Fortunately for us we had on board the carpenter's chest, the tools of which we stowed at the bottom of the boat, and it became a fit place to secure this article.

I next began to examine what clothes there were in the boat, and what other things could be spared; and, having determined the quantity to be kept, the rest was thrown overboard, with some rope and spare sails, which lightened the boat considerably, and we had more room to bale the water out.

I served a tea spoonful of rum to each person (for we were very wet and cold), with a quarter of a bread-fruit, which was scarce eatable, for dinner:—our engagement was now strictly to be carried into execution, and I was fully determined to make our provisions last eight weeks, let the daily proportion be ever so small.

The weather continued very severe. The sea ran higher than in the forenoon, and the fatigue of bailing, to keep the boat from filling, was exceedingly great. But among the hardships we were to undergo, that of being constantly wet was not the least: the night was very cold, and at day-light our limbs were so benumbed, that we could scarce find the use of them. At this

time I served a *tea-spoonful* of *rum* to each person, FROM WHICH WE ALL FOUND GREAT BENEFIT!

MONDAY, MAY 4. I divided five small cocoa nuts for our dinner, and every one seemed satisfied. Served for supper a few broken pieces of bread-fruit, and performed prayers.

The night turned out fair, and, having had tolerable rest, every one seemed considerably better in the morning, and contentedly breakfasted on a few pieces of yams that were found in the boat. After breakfast we examined our bread, a great deal of which was damaged and rotten; this, nevertheless, we were glad to keep for use.

For dinner, I served some of the damaged bread, and a quarter of a pint of water.

WEDNESDAY, MAY 6. We discovered several small islands. Those we were near appeared fruitful and hilly, some very mountainous, and all of a great height. I durst not, however, venture to land, as we had no arms, and were less capable of defending ourselves than we were at *Tofoa*.

Our allowance for the day was a quarter of a pint of cocoa-nut milk, and the meat, which did not exceed

3 X 2

two

two ounces to each person : it was received very contentedly, but we suffered great drought.

To our great joy we hooked a fish, but we were miserably disappointed by its being lost in trying to get it into the boat.

I directed the course W. by N. for the night, and served to each person an ounce of the damaged bread, and a quarter of a pint of water, for supper.

As our lodgings were very miserable, and confined for want of room, I endeavoured to remedy the latter defect, by putting ourselves to watch and watch ; so that one half always sat up while the other lay down on the boat's bottom, or upon a chest exposed to the open air.

Our limbs were dreadfully cramped, for we could not stretch them out ; and the nights were so cold, and we so constantly wet, that, after a few hours sleep, we could scarce move.

THURSDAY, MAY 7. At dawn of day we discovered land. The country appeared to be agreeably interspersed with high and low land, and in some places covered with wood.

Being very wet and cold, I served a spoonful of rum
and

and a morsel of bread for breakfast. At this time we observed two large sailing canoes coming swiftly after us along shore, and, being apprehensive of their intentions, we rowed with some anxiety, fully sensible of our weak and defenceless state. Only one of them gained upon us, which, however, by three o'clock in the afternoon gave over chase. If I may judge from the sail of these vessels, they are of a similar construction with those at the *Friendly Islands*, which, with their situation, gives reason to believe they are the same kind of people. Whether these canoes had any hostile intention against us must remain a doubt: perhaps we might have benefited by an intercourse with them; but in our defenceless situation, to have made the experiment would have been risking too much.

At four o'clock there was much thunder and lightning, and heavy rain, when every person did his utmost to catch some water, and we increased our stock to 34 gallons, besides quenching our thirst for the first time since we had been at sea; but we passed the night very miserably, for being extremely wet, and having no dry things to shift or cover us, we experienced cold and shiverings scarce to be conceived.

FRIDAY, MAY 8. The allowance I issued to-day,

was

was an ounce and a half of pork, a *tea-spoonful* of rum, half a pint of cocoa-nut milk, and an ounce of bread. THE RUM, THOUGH SO SMALL IN QUANTITY, WAS OF THE GREATEST SERVICE! For supper I served a quarter of a pint of water, and half an ounce of bread. I endeavoured to amuse my people by describing the situation of *New Guinea* and *New Holland*, and gave them every information in my power, that in case any accident happened to me, those who survived might have some idea of what they were about, and be able to find their way to TIMOR, which at present they knew nothing of but the name.

SATURDAY, MAY 9. In the morning, a quarter of a pint of cocoa-nut milk, and some of the decayed bread, was served for breakfast; and for dinner I divided the meat of four cocoa-nuts, with the remainder of the rotten bread, which was only eatable by such distressed people. The wind had been moderate all day, in the SE. quarter, with fine weather; but, about nine o'clock in the evening, the clouds began to gather, and we had a prodigious fall of rain, with severe thunder and lightning. Being miserably wet and cold, I served to the people a *tea-spoonful* of rum each, to enable them to bear their distressed situation. The weather continued
extremely

extremely bad, and the wind increased; we spent a very miserable night, without sleep, except such as could be got in the midst of rain.

SUNDAY, MAY 10. The day brought no relief but its light. The sea broke over us so much, that two men were constantly baling; and we had no choice how to steer, being obliged to keep before the waves for fear of the boat filling.

The allowance now regularly served to each person, was one 25th of a pound of bread, and a quarter of a pint of water, at eight in the morning, at noon, and at sun-set.

To-day I gave about half an ounce of pork for dinner, which, though any one would have considered only as a mouthful, was divided into several pieces, and was eat with great slowness.

A fishing line was generally towing from the stern of the boat, but though we saw great numbers of fish, we could never catch one.

The rain abated towards noon, but the wind continued very strong, with very squally weather, and a high breaking sea, so that we were miserably wet, and suffered great cold in the night.

MONDAY, MAY 11. In the morning at day-break,

I served

I served to every person a *tea-spoonful* of *rum*, our limbs being so cramped that we could scarce move them. Our situation was now extremely dangerous, the sea frequently running over our stern, which kept us baling with all our strength. In the evening it rained hard, and we again experienced a dreadful night.

TUESDAY, MAY 12. At length the day came, and shewed to me a miserable set of beings, full of wants, without any thing to relieve them.

Some complained of great pain in the bowels, and every one of having almost lost the entire use of his limbs.

The little sleep we got was no ways refreshing, as we were covered with sea and rain.

I served a *spoonful* of *rum* at day-dawn, and measured out the 25th of a pound of bread, and a quarter of a pint of water, as yesterday.

The wet weather continued, and in the afternoon the wind came from the southward, blowing fresh in squalls. As there was no prospect of getting our clothes dried, I recommended to every one to strip, and wring them through the salt water, by which means they received a warmth which, when wet with rain, they had not.

WEDNESDAY,

WEDNESDAY, MAY 13. I thought it prudent to keep back the allowance of rum at day-break. All this day, we were constantly shipping water, and baling, and suffered much cold and shiverings in the night.

THURSDAY, MAY 14. Fresh gales at S.E. and gloomy weather, with rain, and a high sea. At six in the morning we saw land, which soon appeared to be four islands, one of them larger than the others, and all of them high and remarkable in appearance*.

FRIDAY, MAY 15. At one in the morning another island was discovered. A number of grunnets, boobies, and men of war birds were seen. These islands lie between the latitude $13^{\circ} 16'$ and $14^{\circ} 10' S.$; their longitude, according to my reckoning, $15^{\circ} 51'$ to $17^{\circ} 6' W.$ from the island *Tesoa*; that is $167^{\circ} 17' E.$ to $168^{\circ} 34' E.$ from *Greenwich*. The largest island I judged to be about twenty leagues in circuit, the others five or six. The easternmost is the smallest island, and most remarkable, having a high sugar-loaf hill. They are fertile, and inhabited, as I saw smoke in several places.

The sight of these islands served only to increase the misery of our situation. We were very little better than starving, with plenty in view; yet to attempt pro-

* These were new discoveries.

euring any relief was attended with so much danger, that prolonging of life, even in the midst of misery, was thought preferable, while there remained hopes of being able to surmount our hardships.

The wind was at SE. with rainy weather all day. The night was very dark, not a star could be seen to steer by, and the sea broke continually over us.

SATURDAY, MAY 16. In addition to our miserable allowance of one 25th of a pound of bread, and a quarter of a pint of water, I issued for dinner about an ounce of salt pork to each person. I was often solicited for this pork, but I considered it more proper to issue it in small quantities, than to suffer it to be all used at once or twice, which would have been done if I had allowed it.

The sun breaking through the clouds, gave us hopes of drying our wet clothes; but the sunshine was of short duration. We had strong breezes at SE. by S. and dark gloomy weather, with storms of thunder, lightning, and rain. The night was truly horrible, and not a star to be seen; so that our steerage was uncertain.

SUNDAY, MAY 17. At dawn of day, I found every person complaining, and some of them solicited *extra allowance;*

lowance; which I positively refused. The night was dark and dismal; the sea constantly breaking over us, and nothing but the wind and waves to direct our steering. *The little rum we had was of great service*: for when our nights were particularly distressing, I generally served a *tea-spoonful* or two to each person: and it was always *joyful tidings* when they heard of my intentions.

MONDAY, MAY 18. In the morning the rain abated. The customary allowance of one 25th of a pound of bread, and a quarter of a pint of water, was served at breakfast, dinner, and supper. In the night, we had very severe lightning, with heavy rains; and were obliged to keep baling without intermission.

TUESDAY, MAY 19. Very bad weather and constant rain. With the allowance of bread and water, served half an ounce of pork to each person for dinner.

WEDNESDAY, May 20. Fresh breezes with constant rain; at times a deluge. Always baling. At dawn of day, some of my people seemed half dead: our appearances were horrible; and I could look no way, but I caught the eye of some one in distress. *Extreme hunger* was now too evident, but no one suffered from thirst. The little sleep we got was in the midst of

water, and we constantly awoke with severe cramps and pain in our bones. This morning I served about *two tea spoonfuls* of rum to each person, and the allowance of bread and water, as usual. All the afternoon we were so covered with rain and salt water, that we could scarcely see. We suffered extreme cold, and every one dreaded the approach of night. Sleep, though we longed for it, *afforded no relief*: for my own part, *I almost lived without it*. About two o'clock in the morning we were overwhelmed with a deluge of rain. It fell so heavy that we were afraid it would fill the boat, and were obliged to bale with all our might.

THURSDAY, MAY 21. At dawn of day I served a *larger allowance of rum*. Towards noon the rain abated and the sun shone; but we were miserably cold and wet, the sea breaking constantly over us; so that, notwithstanding the heavy rain, we had not been able to add to our stock of fresh water.

FRIDAY, MAY 22. Our situation this day was extremely calamitous. We were obliged to take the course of the sea, running right before it, and watching with the utmost care, as the least error in the helm would in a moment have been our destruction. At noon it blew very hard, and the foam of the sea kept running over
our

our stern and quarters. The misery we suffered this night exceeded the preceding. The sea flew over us with great force, and kept us baling with horror and anxiety.

SATURDAY, MAY 23. At dawn of day I found every one in a most distressed condition, and I began to fear that another such night would put an end to the lives of several, who seemed no longer able to support their sufferings.

I served an allowance of *two tea-spoonfuls* of rum; after drinking which, having wrung our clothes, and taken our breakfast of bread and water, we became a little refreshed.

SUNDAY, MAY 24. With the usual allowance of bread and water for dinner, I served an ounce of pork to each person. This afternoon we had many birds about us, which are never seen far from land, such as *boobies* and *noddies*. As the sun for the first time for fifteen days shone bright, and the sea was calmed, so that we shipped but little water, I took the opportunity to examine into the state of our bread, and found, that according to the present mode of issuing, there was a sufficient quantity remaining for 29 days allowance; by which time I hoped we should be able to reach **TIMOR**.

But

But as this was uncertain, I determined to proportion the allowance so as to make our stock hold out six weeks.

I was apprehensive that this would be ill received, and that it would require my utmost resolution to enforce it; for, small as the quantity was which I intended to take away, for our future good, yet it might appear to my people like robbing them of life; and some, who were less patient than their companions, I expected would very ill brook it. However, on my representing the necessity of guarding against delays that might be occasioned in our voyage by contrary winds, or other causes, and promising to enlarge upon the allowance as we got on, they cheerfully agreed to my proposal. It was accordingly settled, that every person should receive one 25th of a pound of bread for breakfast, and the same quantity for dinner; so that by omitting the proportion for supper, we had 43 days allowance.

MONDAY, MAY 25. At noon some *noddies* came so near to us, that one of them was *caught* by the hand. This bird is the size of a pigeon. I divided it, with its entrails, into 18 portions, and it was distributed with the allowance of bread and water for dinner, and we eat up bones and all, with salt water for sauce. In the evening,

evening, several *boobies* flying very near to us, we had the good fortune to *catch* one of them. This bird is as large as a duck: like the noddy, it has received its name from seamen, for suffering itself to be caught on the masts and yards of ships. I directed the bird to be killed for supper, and the body, with the entrails, beak, and feet, I divided into 18 shares, and with an allowance of bread, considering all circumstances, we seemed to make a tolerable supper.

TUESDAY, MAY 26. Fresh breezes from the SE. with fine weather. In the morning we caught another booby, so that PROVIDENCE appeared to be relieving our wants in an extraordinary manner. My people were overjoyed at the addition to their dinner, which was distributed in the same manner as on the preceding evening, *Who shall have this?*

The weather was now serene, which, nevertheless, was not without its inconveniences, for we began to feel distress of a different kind from that which we had lately been accustomed to suffer. The heat of the sun occasioned several of our people to be seized with such languor and faintness, that life seemed intolerable. We complained all of dizziness in the head, great weakness of the joints, and violent tenesmus; most of us having
had

had no evacuation * by stool since we left the ship. I had constantly a severe pain at my stomach; but none of our complaints were alarming: on the contrary, every one retained marks of strength, that, with a mind possessed of a tolerable share of fortitude, seemed able to bear still greater fatigue.

MAY 29. We reached the coast of *New Holland*, and the joy of my men at the prospect of finding something on the shore was excessive. We returned God thanks for his gracious protection, and with much content took our miserable allowance of a 25th of a pound of bread, and a quarter of a pint of water, for dinner.

As there were no appearances to make me imagine any of the natives were near us, I sent out parties in search of supplies, while others of the people were put-

* It was so in the case of Betty CANNING, who being confined, because she would not prostitute herself, three weeks in a loft by a gipsy woman, lived during that time upon a crust of bread and a small pitcher of water, and escaped in a most wretched condition. Other circumstances also confirm the truth of her story. It seems to prove that the bile is not the only stimulus wanted to forward the peristaltic motion of the bowels. There are some physicians (vide SHEBBEAR'S *Practice of Physic*) who believe it bears but a slight part, and upon trying experiments with animals, they find, that its natural motions are very slow, and depend almost entirely on the operation of other stimuli, and are quick in proportion to the force of these, as is exemplified by rhubarb, jalap, salts, &c. This subject deserves further attention.

ting

ting the boat in order, that we might be ready to go to sea in case any unforeseen cause should make it necessary.

The parties returned, highly rejoiced at having found plenty of oysters and fresh water. They had made a fire by the help of a small magnifying glass; and what was still more fortunate, we found, among the few things which had been thrown into the boat and saved, a piece of brimstone and a tinder-box, so that I secured fire for the future.

THE SYMPTOMS OF HAVING EAT TOO MUCH BEGAN TO FRIGHTEN SOME OF US; BUT ON QUESTIONING OTHERS, WHO HAD TAKEN A MORE MODERATE ALLOWANCE, THEIR MINDS WERE A LITTLE QUIETED. THE OTHERS, HOWEVER, BECAME EQUALLY ALARMED IN THEIR TURN, DREADING THAT SUCH SYMPTOMS (*which resembled intoxication*) WOULD COME ON, AND THAT THEY WERE ALL POISONED, SO THAT THEY REGARDED EACH OTHER WITH THE STRONGEST MARKS OF APPREHENSION, UNCERTAIN WHAT WOULD BE THE ISSUE OF THEIR IMPRUDENCE. FORTUNATELY THE FRUITS WE OBTAINED HERE PROVED WHOLESOME AND GOOD, OF WHICH I WAS SOON PER-

SUADED, WHEN I SAW THE BIRDS EAT THEM WITHOUT EXPERIENCING ANY HURT*.

SATURDAY, MAY 30. In the morning I discovered a visible alteration in our company for the better, and I sent them away again to gather oysters. We had 38 days allowance, according to the last mode of issuing the 25th of a pound at breakfast and at dinner, and two pounds of pork left. This article, which I did not keep under lock and key as I did the bread, had been pilfered by some *inconsiderate person*, but every one denied having any knowledge of this act; I therefore resolved to put it out of their power for the future, by sharing what remained for our dinner.

While the party was out picking up oysters, I got the boat in readiness for sea, and filled all our water-vessels, which amounted to nearly 60 gallons. On this occasion, fatigue and weakness so far got the better of their sense of duty, that some of the people expressed their discontent at having worked harder than their

* This is a strong evidence of accumulated irritability in the fibre, vide page 546. Persons, says Dr. BEDDOES, who have been shut up in a coal-work from the falling in of the sides of a pit, and have had nothing to eat for four or five days, will be as much intoxicated by a basin of broth, as an ordinary person by three or four quarts of strong beer.

companions, and declared that they would rather be without their dinner than go in search of it. One person, in particular, went so far as to tell me, with a mutinous look, that "he was as good a man as myself." It was not possible for me to judge where this might have an end, if not stopped in time; therefore, to prevent such disputes in future, I determined either to preserve my command, or die in the attempt: and, seizing a cutlass, I ordered him to take hold of another and defend himself; on which he called out I was going to kill him, and humbly implored forgiveness. I did not allow this to interfere further with the harmony of the boat's crew, and every thing soon became quiet.

JUNE 1. NELSON, who had been out with others in search of provisions, was obliged to be brought back, supported by two men. His complaint was a violent heat in his bowels, a loss of sight, much drought, and an almost total inability to walk. This I found was occasioned by his being unable to support the heat of the sun, and his attempting to do more than his strength was equal to. It was now that the little wine, which I had so carefully saved, became of real use. I gave it in very small quantities, with some pieces of bread soaked in it; and he soon began to recover. The boatswain

and carpenter also were ill, and complained of head-ach, and sickness of the stomach.

Towards evening I cautioned every one against making too large a fire, or suffering it after dark to blaze up. Mr. SAMUEL had the superintendence of this business, while I was strolling about the beach to observe if I thought it could be seen from the main. I was just satisfied that it could not, when on a sudden the whole country appeared in a blaze, that might have been discerned at a much more considerable distance. I ran to learn the cause, found that it was occasioned by the obstinacy and imprudence of one of the party, who, in my absence, had insisted on increasing the fire, in doing which the flames caught the neighbouring grass, and rapidly spread. This misconduct might have produced very serious consequences, by discovering our situation to the natives; for, if they had attacked us, we had neither arms nor strength to oppose an enemy. Thus the relief which I expected from a little sleep on shore was totally lost, and I anxiously waited for the flowing of the tide, that we might proceed to sea.

We had now remained just six days on the coast of *New Holland*, where we found oysters, a few clams,
some

some small fruits, birds*, and water. But perhaps a benefit nearly equal to this we received, by having been relieved from the irksomeness of being constantly in a crowded boat, and by obtaining good rest at night.

These advantages certainly preserved our lives; and, small as the supply was, I am very sensible how much it alleviated our distresses. By this time nature would have sunk under the extremes of hunger and fatigue. Some would have ceased to struggle for a life that only promised wretchedness and misery; and others, though possessed of more bodily strength, must soon have followed their unfortunate companions. Even in our present situation, we were most deplorable objects; but the hopes of a speedy relief kept up our spirits. I was secretly surprised to see that my men seemed as if they had embarked on a voyage to TIMOR in a vessel calculated for safety and convenience. So much *confidence* gave me great pleasure, and I may venture to assert, that to *this cause* our preservation is chiefly to be attributed. For my own part, incredible as it may appear,

* Robert Lamb, when he came to Java, acknowledged that, in one of the foraging parties, he had separated from his companions, and had eat nine birds raw, which he had caught.

I FELT NEITHER EXTREME HUNGER NOR THIRST*.

My allowance contented me, knowing that I could have no more.

JUNE 4. We were now launched into the open ocean, and I served one 25th of a pound of bread, and an allowance of water, for breakfast, and the same for dinner, with an addition of six oysters to each person.

JUNE 5. Six oysters were, as yesterday, served to each man, in addition to the usual allowance of bread and water. In the evening, a few boobies came about us, one of which I caught with my hand. With the allowance of bread I served a quarter of a pint of water for supper, and to some, who were most in need, half a pint. In the course of the night, being constantly wet with the sea, we suffered much cold and shiverings.

JUNE 6. At day-light I found that some of the clams, which had been hung up to dry for sea store, were stolen; but every one solemnly denied having any knowledge of it. In the afternoon, I took an opportunity of examining our store of bread, and found re-

* Vide page 546.

maintaining 19 days allowance, at the former rate of serving one 25th of a pound three times a day: therefore, as I saw every prospect of a quick passage, I again ventured to grant an allowance for supper, agreeable to my promise at the time it was discontinued.

JUNE 7. We had passed the night miserably wet and cold, and in the morning I heard nothing but heavy complaints. The sea was high and breaking over us. I could only afford the allowance of bread and water for breakfast; but for dinner I gave out an ounce of dried clams to each person, which was all that remained. The sea ran very high all this day, and we had frequent showers of rain, so that we were continually wet, and suffered much cold in the night.

Mr. LEDWARD, the surgeon, and Lawrence LE-BAGUE, an old hardy seaman, appeared to be giving way very fast. I could only assist them by a tea-spoonful or two of wine, which I had carefully saved, expecting such a melancholy necessity.

At four in the afternoon, we caught a small dolphin, which was the first relief of the kind that we obtained. I issued out two ounces to each person, including the offals, and saved the remainder for dinner the next day.

Towards

Towards evening the wind freshened, and it blew strong all night, so that we shipped much water, and suffered greatly from the wet and cold.

On JUNE 9. At day-light, as usual, I heard much complaining, which my own feelings convinced me was too well founded. Served the usual allowance of bread and water, and at noon we dined on the remains of the dolphin, which amounted to an ounce per man. This afternoon I suffered great sickness from having the stomach of the fish, which had fallen to my share at dinner. At sun-set I served an allowance of bread and water for supper.

On JUNE 10. In the morning, after a very comfortless night, there was a visible alteration for the worse in many of the people; which gave me great apprehensions.

An extreme weakness, swelled legs, hollow and ghastly countenances, A MORE THAN COMMON INCLINATION TO SLEEP, with an apparent debility of understanding, seemed the melancholy presages of approaching dissolution.

The surgeon and LABOGUE, in particular, were most miserable objects. I occasionally gave them a few tea-spoonfuls of wine, out of the little that remained, which greatly assisted them. Gannets, boobies, men of war birds,

birds, were constantly about us. I encouraged the men with the hopes of a very few days longer, at the present fine rate of sailing, and we should reach TIMOR. This expectation was our principal support.

JUNE 11. Every one received the accustomed allowance of bread and water, and an extra allowance of water was given to those who were most in need. In the afternoon we saw gannets, and many other birds, and at sun-set we kept a very anxious look out. In the evening we caught a booby, which I reserved for our dinner the next day.

FRIDAY, JUNE 12. At three in the morning, with an excess of joy, we discovered TIMOR, bearing WNW.

It is not possible for me to describe the pleasure which the blessing of the sight of this land diffused among us. It appeared scarce credible to ourselves, that in an open boat, and so poorly provided, we should have been able to reach the coast of TIMOR in 41 days after leaving TOFOA, having in that time run, by our log, a distance of *three thousand, six hundred, and eighteen miles*; and that, notwithstanding our extreme distress, no one should have perished in the voyage.

The day gave us a most agreeable prospect of the

land, which was interspersed with woods and lawns; the interior part mountainous, but the shore low. Towards noon the coast became higher, with some remarkable headlands. We were much delighted with the general look of the country, which exhibited many cultivated spots and beautiful situations; but we could only see a few small huts, whence I concluded that no European resided in this part of the island. Much sea ran on the shore, which made landing impracticable.

JUNE 13. Not perceiving any sign of settlement, we bore away to the westward, steering along shore. We had a view of a beautiful looking country, as if formed by art into lawns and parks. At two o'clock, having run through a very dangerous breaking sea, the cause of which I attributed to a strong tide setting to windward, and shoal water, we discovered a spacious bay or sound, with a fair entrance about two or three miles wide. I came to a grapnel near the east side of the entrance, in a small sandy bay, where we saw a hut, a dog, and some cattle; and I immediately sent the boatswain and gunner away to the hut, to discover the inhabitants.

They returned with five Indians, and informed me that they had found two black families, where the women

men treated them with European politeness. They brought us a few pieces of dried turtle, and some ears of Indian corn, and offered to fetch us some other refreshments if I would wait: but we determined to push on.

We kept close to the east shore under all our sail; but, as night came on, the wind died away, and we were obliged to try at the oars, which I was surprised to see we could use with some effect.

SUNDAY, JUNE 14. At one o'clock in the morning, after the most happy and sweet sleep that ever men enjoyed, we weighed, and continued to keep the east shore. The report of two cannon that were fired in the morning early gave new life to every one. We soon after discovered two square-rigged vessels and a cutter at anchor to the eastward. We endeavoured to work to windward, but were obliged to take to our oars again, having lost ground on each tack. At day-light we landed amidst a crowd of Indians, and were agreeably surprised to meet with an English sailor, who belonged to one of the vessels in the road.

The abilities of a painter, perhaps, could seldom have been displayed to more advantage, than in the delineation of the two groups of figures, which at this time

presented themselves to each other. An indifferent spectator would have been at a loss which most to admire; the eyes of famine sparkling at immediate relief, or the horror of their preservers at the sight of so many spectres, whose ghastly countenances, if the cause had been unknown, would rather have excited terror than pity. Our bodies were nothing but skin and bones, our limbs were full of sores, and we were clothed in rags: in this squalid condition, with the tears of joy and gratitude flowing down our cheeks, the people of TIMOR beheld us with a mixed sensation of horror, surprise, and pity.

They ran with eagerness to procure a surgeon to dress our wounds, to get apparel to cover our nakedness, and a place suitable for our reception. The governor, who was dying of an incurable disease, even hastened from his bed to welcome our arrival. People ran with chairs, tables, benches, and bedding, to an empty house that was assigned us. A plentiful dinner was soon laid before us: but for my own part I felt no extraordinary inclination to eat or drink. My mind kept musing on the mercy of ALMIGHTY GOD, who had made me the instrument of saving eighteen lives; and as I reflected how providentially we escaped at *Tofoa*, by the Indians
delaying

delaying their attack; and that, with not more provisions than might have been consumed in five days, we crossed a sea of more than twelve hundred leagues, without shelter from the inclemency of the weather; that in an open boat, with so much stormy weather, we escaped foundering; that not any of us were taken off by disease; that we had the great good fortune to pass the unfriendly natives of other countries without accident, and at last happily to meet with the most friendly and best people to relieve our distresses;—I say, when I reflected on all these wonderful escapes, the remembrance of such great mercies enables me to bear, with resignation and cheerfulness, the failure of an expedition, the success of which I had so much at heart, and which was frustrated at a time when I was congratulating myself on the fairest prospect of being able to complete it in a manner that would fully have answered the intention of his Majesty, and the humane promoters of so benevolent a plan.

That

That the state of Captain BLIGH and his company was that of ACCUMULATED IRRITABILITY, is strongly pointed out.

1st. From one tea-spoonful of rum producing on these poor men, benumbed as they were with cold, as much effect as twenty times the quantity would have on those who are warm and well fed. And indeed had it not been for the spirits having such a power to act upon men in their condition they never could have survived the hardships they experienced.

2dly. From the berries found in *New Holland* producing symptoms of intoxication*, which would not have arisen under any other circumstances.

3dly. By the general want of sleep at first, and that which was obtained not refreshing; but, as with extreme cold, when the accumulation of irritability was such as to threaten the extinction of life, I observed, says this gallant officer, "a more than common propensity to sleep †."

* Vide page 533.

† Vide page 540.

In the last campaign in India, when the Marquis CORNWALLIS was in possession of TIPPoo SULTAN's palace, and his gardens, at *Bangalore*, and was preparing to drive him from his capital, the indignant sultan expressed his ineffectual rage by the continual fire of cannon on our troops. As this display of his wrath could effect little, he came to Lieutenants CHALMERS and NASH, with the welcome tidings of an intended release, and requested them to take two letters on the subject of peace, which he said he had been very anxious to obtain ever since the commencement of the war. He presented them with two shawls each, and five hundred rupees, and ordered horses and attendants to go with them to the camp. He had at this very time concerted a scheme to destroy the commander in chief of our forces, whom he thought by this expedient to lull into a treacherous security. As our allies, the NIZAMS, had their army stationed at some small distance from ours, he ordered a party of horse to steal between the two armies, which affecting to belong to the NIZAM, asked our piquets for the *Burra Said*, or chief. Not suspecting them to be enemies, they pointed to his tent. These horsemen galloped immediately towards the tent, and having drawn their swords, cut down several lascars and people in their rout.

A party

A party of sepoy's having turned out with alacrity, their progress was soon stopt. Some shots were fired at them as they retreated, but they got off however, having sustained very little loss.

This scheme, says Major DIRAM, was one of those daring projects that have been so frequently practised by the native powers against each other in effecting revolutions in the East: and had these assassins been conducted by a guide, or their judgment been equal to their spirit in the attempt, it is possible they might have effected their murderous project. But the *Mahomedan borse*, when sent upon such services, are kept *fasting*, and then intoxicated with *bang*, a plant mixed with their tobacco, of which they take a large dose before they enter upon so hazardous an enterprise. This inebriation renders their exertions so wild and disunited, that it is almost impossible for them ever to prove successful against a vigilant enemy.

It was thus in former days, when the Jesuits wanted any desperate act of wickedness to be done, having pitched upon their man, they would shut him up in a large chamber lighted with a small taper no bigger than one's little finger, and hung with black cloth, on which were painted hell flames and devils, and all manner of
terrible

terrible shapes: This was called the chamber of meditation: and here the person was kept meditating and *fasting* for twenty-four hours; he was then worked up to the pitch, at which his employers wanted him, by an *intoxicating draught*; and, shocking as it is to tell, it is nevertheless true, that the errand on which he was sometimes sent after this preparation was MURDER.

Perhaps, says Dr. PERCIVAL, in the case of SEXTIUS BACULUS, as recorded in the Commentaries of Cæsar, the extraordinary courage and prowess which he suddenly exerted, might be aided by the *exhilarating effect* of sustenance, which, under such circumstances, it is probable he would no longer decline. He had *fasted* several days: but hearing that the enemy was entering by the gate of the fortress, he *alone* resisted the combined efforts of a superior power, until the centurions, and others, came to his assistance, who took him away from the place of contest covered with wounds.

I have been informed, adds this eminent philosopher, by a young physician from *Geneva*, that, when he was student at *Montpelier*, he fasted three days and nights with no other refreshment than a pint of water daily. His hunger was keen, but never painful, during the first and second days of his abstinence; and on the third

day he perceived only a faintness, when he attempted either bodily or mental exertion. A sense of coldness was diffused over his whole frame, but more particularly affected the extremities. During the whole period the alvine exertions were suppressed*, and at the close of it, his skin became tinged with a shade of yellow. The first food he took was *veal broth*, which had something of an *intoxicating effect*, producing a glow of warmth, and raising his spirits, so as to render him ashamed of his despondency.

HIPPOCRATES has very justly observed, that *children*, (who possess abundant irritability), are more affected by abstinence than young persons; *these* more than the middle aged; and the *middle aged* more than old men.

Agreeable to this aphorism, DANTE is said, by his countryman MORGAGNI, to have framed the incidents in the affecting story of Count UGOLINO, a nobleman of *Pisa*, who was confined, with his four sons, in the dungeon of a tower; the key of which being cast into the river *Arno*, they were, in this horrible situation, starved to death. And they are represented by the poet, as dying at different periods, according to their respective ages.

* Vide page 532.

Now the fourth morning rose; the youngest child
 fell at his father's feet, in accent wild,
 struggling with pain, with his last fleeting breath,
 "Help me, my fire," he cried, and sunk in death.
 He saw the others follow one by one—
 Heard their last scream,—and their expiring groan.

In our attempts to recover those who have suffered under the calamities of FAMINE, great circumspection is required. Warmth, and cordials, are the means usually employed; and it is evident that these may prove too powerful in their operation, if not administered with caution and judgment. For the body, by *long fasting*, as we have seen, is reduced to a state of *extreme irritability*; the minuter vessels of the brain, and of other organs, collapse for want of fluids to distend them; the stomach and intestines shrink in their capacity; and the pulsations of the heart and arteries are quick and feeble, with scarce sufficient energy to propel the scanty current of blood. Under such circumstances there are instances of persons who have been suddenly struck dead in consequence of having took a *full meal*, and drank a *glass* of brandy. As with those who have been *frost-bitten*, or *drowned*, friction with *snow* or *cold water*, is the only

safe *stimulus* that can at first be applied to the surface, so here the *lowest stimulus* in the scale is to be preferred to that *sudden transition* too often practised by *unphilosophic* practitioners. The external heat, says Dr. PERCIVAL, should be at first lower than that of the human body, and gradually increased, according to the effects of that stimulus. Whey, gruel, weak broth, is the only nourishment that can with propriety be administered. If cordials are employed, they should be given with the most frugal hand, and considerably diluted. Perhaps wine-whey might be better, and when the *superfluous irritability* is a little worn off, and the stomach strengthened, an egg may be mixed with the whey, or administered under some more agreeable form. But let it be remembered as an indubitable maxim, adds Dr. PERCIVAL, "*that the return to a full diet should be conducted with great caution, and by very slow gradations.*"

SECT. XLV.

ON ASPHYXIA FROM COLD.

THE advantage of clothing, as fencing out the cold, or, in more philosophic language, as retaining the inbred, or vital, heat, has been before considered. We are now therefore to contemplate the effects of *extreme cold*.

Ah! little think the gay licentious proud,
whom pleasure, power, and affluence surround;
they, who their thoughtless hours in giddy mirth,
and wanton, often cruel, riot waste.

Ah! little think they, while they dance along,
how many feel, this very moment, death
and all the sad variety of pain.

How many sink in the devouring flood,
or more devouring flame. How many bleed,
by shameful variance betwixt man and man.

How many pine in want, and dungeon-glooms;
shut from the common air, and common use
of their own limbs. How many drink the cup
of baleful grief, or eat the bitter bread
of misery. Sore pierced by wintry winds,

how many shrink into the fordid hut
of cheerless poverty.—Perhaps, the swain
hies homeward to his family, now
disaster'd stands; sees other hills ascend,
of unknown joyless brow; and other scenes
of horrid prospect, bleach the trackless plain:
nor finds the river, nor the forest, hid
beneath the formless wild; but wanders on
from hill to dale, still more and more astray;

Impatient

impatient flouncing through the drifted heaps,
 stung with the thoughts of home; the thoughts of home
 rush on his nerves, and call their vigour forth
 in many a vain attempt. How sinks his soul!
 what black despair, what horror fills his heart?

when for the dusky spot, which fancy feign'd
 his tufted cottage rising thro' the snow,
 he meets the roughness of the middle-waste,
 far from the track, and blest abode of man;
 while round him night resistless closes fast,
 and every tempest, howling o'er his head,
 renders the savage wilderness more wild.

Then throng the busy shapes into his mind,
 of cover'd pits, unfathomably deep,
 a dire descent! beyond the power of frost,
 of faithless bogs; of precipices huge,
 smoothed up with snow; and, what islands unknown,
 what water, of the still unfrozen spring,
 in the loose marsh or solitary lake,
 where the fresh fountain from the bottom boils.

These check his fearful steps;—and down he sinks
 beneath the shelter of the shapeless drift,
 thinking o'er all the bitterness of death,
 mix'd with the tender anguish nature shoots
 thro' the wrung bosom of the dying man,
 his wife, his children, and his friends unseen.—

In vain for him th' officious wife prepares
 the fire fair blazing, and the vestment warm.

In vain his little children, peeping out
 into the mingling storm, demand their fire,
 with tears of artless innocence. Alas!

nor wife, nor children, more shall he behold,
 nor friends, nor sacred home. On every nerve
 the deadly winter seizes; shuts up sense,

and,

and, e'er his inmost vitals creeping cold,
lays him along the snows, a stiff'ned corse,
stretched out, and bleaching in the northern blast.

When through exposure to extreme cold, the fingers, or other external parts of the human body are frozen, the heat in these parts must necessarily be reduced to the lowest point consistent with life. If artificial heat be suddenly applied, a mortification ensues, and the parts, that have been *frost-bitten* drop off. But if they be thawed by friction with snow, and afterwards the gentlest warmth be then gradually applied, the parts are soon restored to their wonted use and activity*.

When the state of torpor or apparent death is brought on, whether in the dormant animals, or the man, whether by the sedative effects of cold, or by submerfion, the phænomena are extremely fimilar.

Both are bereft of SENSE and MOTION. *Both* lose a large portion of ANIMAL HEAT. *Both* on their first recovery exhibit fimilar efforts towards restoring RESPIRATION and CIRCULATION. *Both* are restored by a gentle

* Vide page 422.

degree,

degree of WARMTH, and are destroyed by a HEAT too great, or too suddenly applied. Indeed the GRAND SECRET of the art of restoring *suspended animation*, consists in NICELY ADJUSTING THE NATURAL AND ARTIFICIAL STIMULI TO THE EXACT TONE OF THE IRRITABLE FIBRE.

If the recovery of the *marmot* is more uniformly certain, it is not only because the torpor is more gradual, but because the degree of heat is regulated by the steady, unerring hand of NATURE; whereas in man, it is governed by the uncertain and often capricious rules of ART.

END OF THE THIRD VOLUME.